In-Depth Coverage from Vine to Market

July/August 1987

PRACTICAL WINERY & VINEYARD

Embossed Bottle Identifies Amador Wines

This Issue: Preparing for Fermentation

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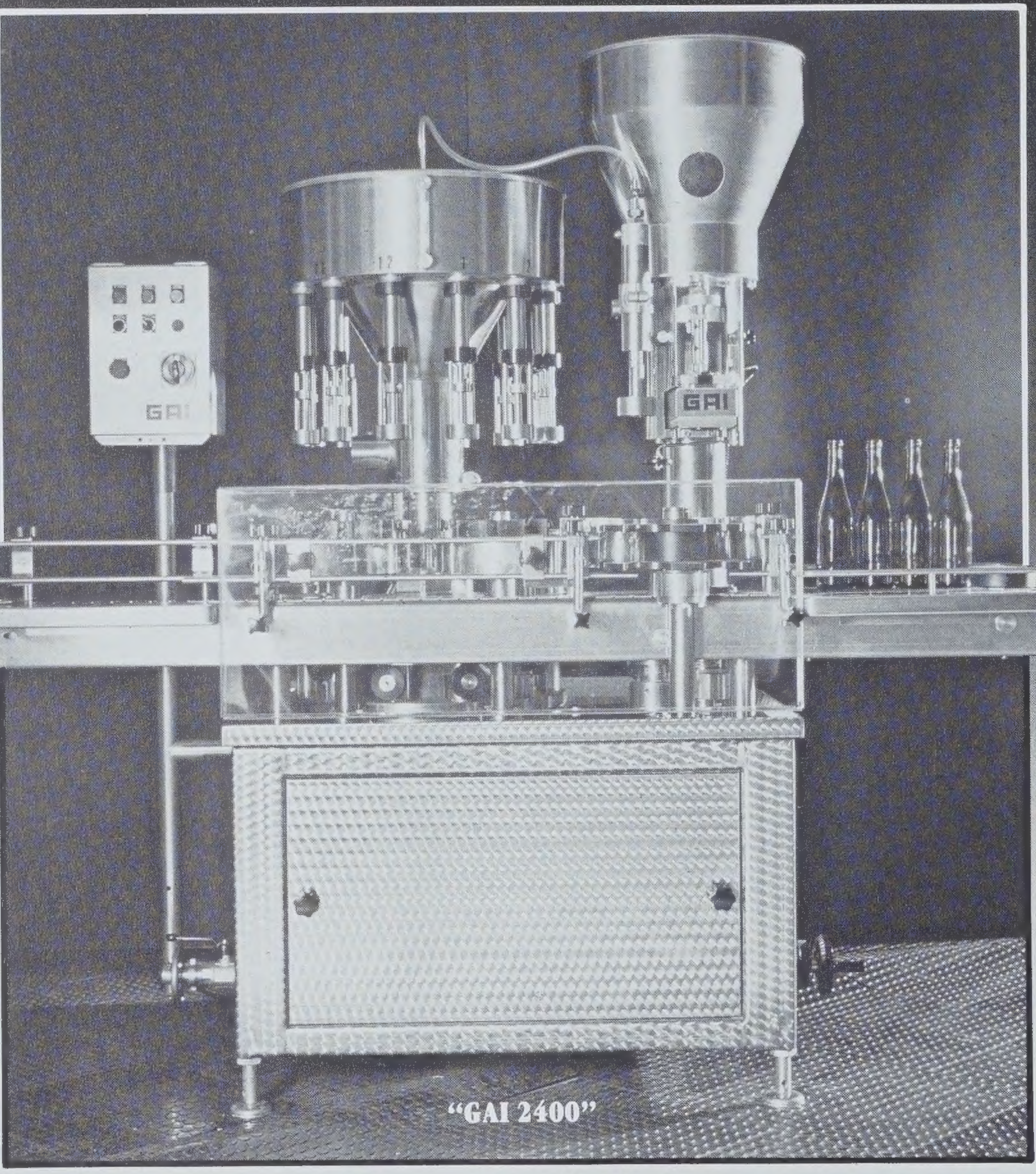

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JULY / AUGUST 1987
VOLUME VIII, NO. 2

Features

VARIETAL REPORT

20 The Challenge of Zinfandel, Part II . . . . *Rhoda Stewart*

WINEMAKING

28 Preparation of Yeast Starters . . . . *K.C. Fugelsang*
33 Protein Fining Agents, Part II . . . . *Bruce Zoecklein*
44 Inducing Simultaneous Malolactic/Alcoholic Fermentation . . . . R.B. Beelman & R.E. Kunkee

MARKETING

42 Embossed Bottle Indentifies Amador Wines . . . .

PURCHASING GUIDES

37 What's Available in Enzymes, Yeast, & Malolactic Bacteria
40 Marketplace
58 Advertiser Product/Service Index

See page 42.

Departments

6 The Wine Retailer . . . . *Stan Hock*
10 Winery Water & Waste . . . . *David Storm*
16 The Wine Lawyer . . . . *R. Corbin Houchins*
19 Upcoming Events
13 PRACTICAL WINERY/VINEYARD Subscription Form
15 Free Run
47 Bookshelf

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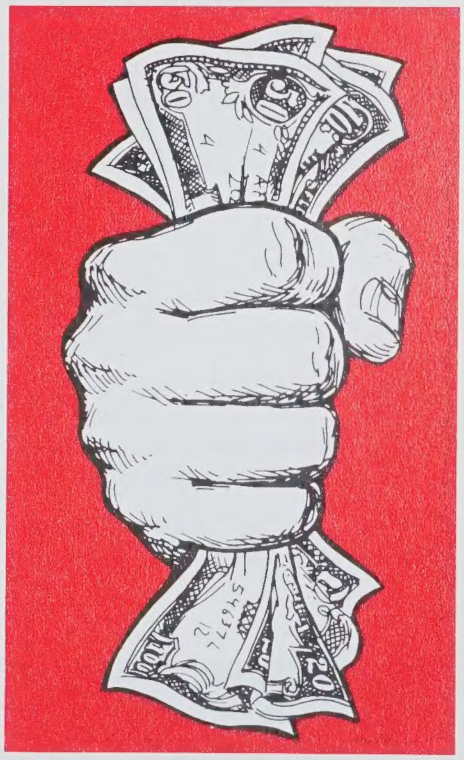
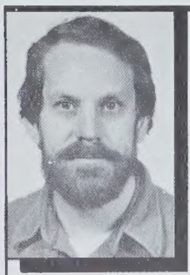


Coming next issue:
First **PRACTICAL WINERY/VINEYARD** salary survey of winery and vineyard personnel.

Cover

Amador Vintners Association introduces embossed bottles to identify wines.

"Wine is the invigorator of mind and body, antidote to sleeplessness, sorrow, and fatigue; producer of hunger, happiness, and digestion." *Ayur-Veda (ancient system of medicine)*



The Wine Retailer

Stan Hock

Are You Ready for the New Inquisition?

I've lived and worked in Berkeley, CA, for a long time, so I'm used to people who are suspicious about what they eat and drink.

For years, Berkeley citizens have quizzed my partners and me about 'chemicals' in wine, have sought explanations from us for the allergic reactions some of them experience after consuming wine, and have eagerly sampled the products of California's few 'organic' winemakers. Naturally—this is Berkeley, after all—I always assumed that such health concerns were far less prevalent among wine drinkers in other, more conservative, communities.

Now that America is in the midst of another spasm of puritanical righteousness, however, Berkeley's brand of vigilant consumerism is striking a responsive chord in the national psyche, at least in regard to mankind's old friend and nemesis, demon alcohol.

The 'Just Say No' Generation

These days, our leaders and role models (even some rock and roll icons) are urging us to 'just say no' to an entire spectrum of self-indulgent activities that purportedly threaten the stability of family and state. Certainly, no person of reason denies that drug addiction, alcoholism, teenage pregnancy, and sexually-transmitted disease are authentic social and public health crises, whose effects can and do destroy the lives of a great many people.

Yet it's alarming that our politicians, in league with the lords of the corporate business world, seem to be exploiting the widespread anxiety which these issues generate in order to institute a brand-new set of social controls. Compulsory drug testing, proposals that AIDS carriers be quarantined, laws requiring counseling centers to inform on minors who solicit contraceptive aids—such measures are not that far removed in spirit or intent from the efforts of those who agitate for health warning labels on alcohol beverage containers.

Each may seem a legitimate response to insoluble social problems that threaten to engulf us in chaos, but they also allow already powerful centers of authority—the government, the police, one's employer or doctor—to intrude further into our private lives, endangering the very essence of our freedom—which is our indisputable right to control our own bodies.

There are ironies galore in America's mobilization for moderation. (If the '60s were the heyday of the 'we generation' and the '70s the refuge of the 'me generation', then the '80s seem to be degenerating into the nightmare of the 'please check my pee' generation.) First and foremost, it features an unholy and apparently unconscious alliance of affluent baby-boomers (who in the '60s defiantly raised the banner of unfettered self-indulgence) and their cultural opposites, the fundamentalist ideologues of the Religious Right.

Baby-boomers jumped on the self-denial bandwagon initially as a paean to health and fitness (when the first intimations of mortality crept into our once-heathen collective consciousness, we instinctively grabbed for tofu and jogging shoes), but many seem now to have bought into abstinence as a career-enhancing, self-justifying creed. This new yuppie self-denial, fueled perhaps by guilt over the abandonment of youthful ideals in favor of crasser pursuits, dovetails neatly with the Religious Right's vociferous moral crusades against sex, drugs, and alcohol.

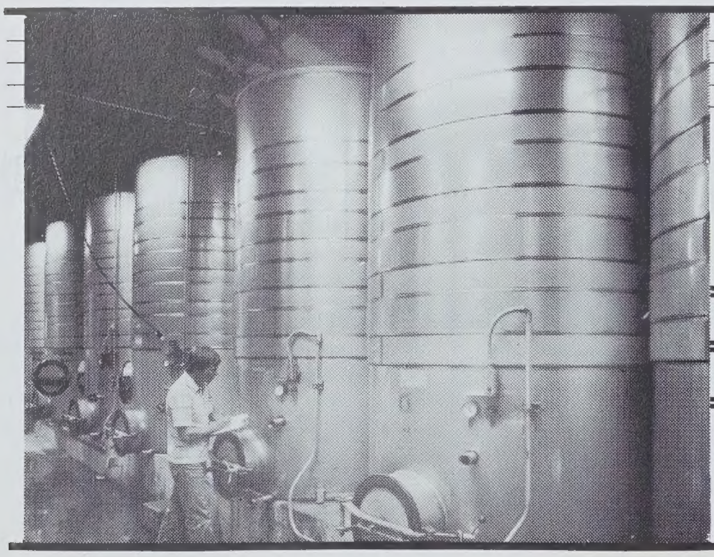
As unlikely as the alliance seems—and despite their vast differences in ideology and modes of expression—the two camps do in fact share an important underlying assumption: that the pursuit of pleasure may lead to disaster.

Look Out, You're Next

If you think I'm indulging in some cockeyed left-wing rhetoric with no relevance to the wine business, think again. There are powerful forces in this country that are promoting the view that wine is just another dangerous drug, a potentially toxic substance that may cause cancer, birth defects, and severe respiratory ailments.

These forces, operating under the guise of responsible consumer advocacy, are collaborating with a resurgent temperance movement—and establishment groups like Mothers Against Drunk Driving—to press government to institute repressive controls on the wine industry. These would include health warning labels, punitive taxes, and bans on broadcast advertising—any and all measures that dissuade people from buying and drinking wine.

The Wine Institute has already conceded the first battle in this war for the mind of the American wine drinker. New wine labels now must include the language 'contains sulfites' (or words to that effect), a message certain to confuse and alarm many consumers. If the Center for Science in the Public Interest (CSPI) has its way, sulfite disclosure will be just the first of



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many damaging admissions about their products that winemakers will be forced to make.

CSPI, an increasingly powerful Washington, D.C., consumer-advocacy group, successfully lobbied FDA and BATF on the sulfite issue, and its zealots now are busy sensationalizing Canadian and FDA studies of urethane levels in wine. CSPI is also intent on pressuring Congress to legislate mandatory health warning labels on all alcohol beverage containers, akin to those on cigarette packages. These would bombard the consumer with a host of dubious propositions, among them that wine-drinking leads to liver disease and cancer and may cause serious damage to the unborn children of pregnant women.

CSPI predicates its ferocious, many-pronged attack on the wine industry on its belief that wine has unfairly escaped the disgrace now attaching to other alcoholic beverages. This is analogous to the Marxist-Leninist notion that bourgeois liberalism is really more sinister than feudalism, because it more effectively disguises capitalism's insidious nature.

Echoes of CSPI's campaigns against the wine industry now are reverberating throughout the country. The California state legislature has three times considered a bill that would mandate a health warning to pregnant women on the front labels of wine bottles (and all other alcohol containers). This would include not only a verbal admonition regarding the tragic effects of fetal alcohol syndrome, but also a more chilling formulation of the same message: a pictograph with a black slash superimposed upon the profile of a pregnant woman holding a wine glass. The bill has died each time in committee, but it undoubtedly will surface again, as will similar legislation introduced on a federal level.

Life on the Front Lines

It's tempting for those of us in the wine trade to assume that wine's primary role in the history of human culture, its symbolic importance in the Judeo-Christian religious tradition, somehow shelters it from the prohibitionist zealotry that periodically sweeps this country. Recent history, however, teaches otherwise.

We may also choose to delegate to the Wine Institute the task of rebutting the irrational claims of demagogues with the irrefutable facts of wine's great value to mankind. Indeed, the Institute has been diligent in disseminating the results of modern medical research—research which simply bears out millenia of human experience—regarding the benign effects of moderate wine consumption.

These include wine's ability to reduce tension, aid digestion, and promote sociability (more than half our hospitals now make wine available to their patients), as well as its capacity to help prevent heart disease (through improving blood circulation). In short, there is an abundance of scientific, historical, and experiential data proving that wine is a food which helps to enrich and prolong human life.

As skillful as our representatives may be in promoting this benevolent view of wine, however, it is foolhardy to think they alone can protect it from attack, from the wrath of a society at war with self-indulgence. If you own a winery or work in one, sell wine or write about it, your livelihood is in danger. If you operate a tasting room or wine bar, you and your employees or co-workers will be confronted in the coming months and years by the interrogations of people bewildered and frightened by the vengeful prophets of abstinence.

Is your wine safe, they will ask? How much sulfite, how much urethane does it contain? Is it true that drinking wine can harm a fetus? Does wine really cause cancer? These are the questions which the new prohibitionist mentality is fomenting and hurling your way.

Retailers, of course, will be called upon to answer these questions too, to defend what they do for a living. And this won't occur only in places like Berkeley.

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Do Your Homework

Clearly, the wine industry is on the defensive. Its accusers, in a climate of anti-intoxicant hysteria, have the ear of the decision-making apparatus and the attention of a media industry perpetually starved for scandal.

We know from experience that when fire alarms go off in crowded movie theatres, few viewers wait in their seats to hear from the manager. Well, a great false alarm is now sounding in the theatre of wine, and we had best jam the aisles with the antidote to the panic it will surely engender: the truth.

For instance, few consumers reading the statement 'contains sulfites' will know:

that sulfites occur naturally in wine as a byproduct of fermentation;

that they have been added to wine as a sterilizing and preserving agent for over 200 years, apparently without incident;

that most California wineries use far less than the amount of sulfites which BATF regulations allow;

and that only a minuscule proportion of the general population (less than 1%, according to the FDA), all of them hyperallergenic asthmatics, are susceptible to adverse reactions from encountering sulfites in wine. Nor will many have considered the logical point that, since hyperallergenic asthmatics invariably are under a doctor's care, they already should know what they can and cannot consume safely.

Similarly, few wine drinkers are likely to know what prompted CSPI's current hysteria about urethane, a suspected carcinogen found in trace amounts in fermented substances like wine, bread, and yogurt. Last year, Canadian authorities removed 300,000 bottles of fortified wines and fruit brandies from retail shelves because of high urethane levels. This led FDA to check a sampling of American wines, about 15% of which had levels above the stringent 30-ppm standard enacted by the Canadians (the U.S. currently has no standard).

UC Davis enologists say that the average California table wine has about 5 ppm urethane, a tiny and almost certainly safe amount. Obviously, urethane in wine is a matter to be studied and regulated, but using the Canadian and FDA studies to claim that wine causes cancer, as CSPI has done, is ludicrous and completely irresponsible.

Finally, with regard to using health warning labels alerting pregnant women to fetal alcohol syndrome: It seems self-evident that overconsumption of any alcoholic beverage poses health risks for the unborn child of the drinker. Alcoholics are unlikely to pay heed to alarming pictographs, however, because by definition they are unable to control themselves.

The women who will pay attention to such alarmist messages may translate them into an erroneous, unwarranted conclusion: that drinking an occasional glass of wine can harm their child. There is no scientific evidence whatsoever, nor anything in the recorded history of western culture, to support this supposition. Warnings on wine bottles will simply create a climate of fear that need not exist and that benefits no one.

Winemakers and those who work for them must be prepared to address these issues in a clear, direct, and demystifying way whenever they meet the public. They must be armed with the weapons of a free society—facts, figures, and logical, commonsense arguments. Making printed literature on health issues available in tasting rooms is a good idea, but winery workers must also be prepared to respond when queried by visitors.

Retailers must be up to speed as well, because their customers are now worrying about the safety of a beverage that men and women have consumed, with no ill effects, since the dawn of human history.

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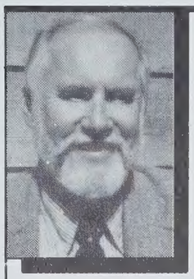

Winery Water & Waste

D.R. Storm, Ph.D, P.E.

Physical Fitness & Beverage Preference Surveys

There is nothing to occupy my mind when I am performing my morning jogging ritual, and, of course, that is one of the alleged benefits—to let your mind think of nothing but concrete, asphalt, or clouds. While making the circuit around my neighborhood, there is little to occupy my interest except seeing whose lawn is getting shaggy or infested with dandelions (probably the ones whose parachute-equipped offspring are sprouting in my lawn).

Recently, however, I have taken an interest in doing my own beverage survey, based upon the mix of bottles that are left on the curb for recycling. (Davis, CA, is famous for its waste recycling program.) My survey would not be possible except for the fact that recycled materials are separated from general refuse. (I could not see myself pawing through someone's garbage just to see their preference for beverages.)

In order for this survey to be statistically significant, I must assume that I live in an average neighborhood and that the residents of my area run the full range from alcoholic-beverage abstainers to problem drinkers. My sample area is also a square 15 blocks on a side and I have been accustomed to running only the perimeter to ensure my Human Performance Laboratory-specified 3.0-mile distance. To be sure that I wasn't biasing my bottle observations, I would vary my running pattern to cover the cross streets in both directions in my sample grid.

My conclusions from my 12-week survey are:

1) Some people don't use glass bottles at all (or they don't choose to recycle).

2) The consistent bottle recyclers have apparently rather consistent patterns of beverage consumption, showing a nearly-balanced mix of fruit juice (250–375mL), mineral water (250–750mL), beer (355 mL), and wine coolers.

3) Distilled-spirit bottles, while scarce in my test area, were almost entirely of the 'white spirits' variety (rum, gin, vodka, or tequila).

4) Wine bottles were almost exclusively of the 1.5L size. A scattering of 750mL champagne bottles was probably indicative of a special occasion such as a birthday or anniversary.

It seems that the results of my limited survey are consistent with what I read in a host of wine, beverage, and liquor industry magazines that are received monthly at my winery.

The only trend not observed in my 15-square block test area was the upscale move of wine consumers to super-premium wines. This anomaly may be due to the nature of the Davis community as a stratified, middle-economic class, highly influenced by the university student population (over one-half of the current population consists of students).

As further evidence of beverage preference trends, I contacted the Davis Recycling Center, and they provided the following approximate average percentages of bottle-types recycled:

	Percent Recycled
Beer	60%
Wine	20%
Other: juice, mineral water, wine coolers, miscellaneous glass jars	20%
	100%

Certainly there is the opportunity here for at least a master's thesis for someone using post-consumer glass as the yardstick in consumer beverage preferences.

If you are a neighborhood jogger or walker in a town or city which recycles glass, let me know what you observe. If the local recycling center will give you their percentages recovered by category, please send a note with your findings to: David Storm, Storm Engineering, P.O. Box 681, Winters, CA 95694.

Sewage Pump Stations: Operation, Design Decisions, Equipment Choices

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tion, as they are often called. If you have read the previous columns in this series, you might recall the designation of certain elements in a winery wastewater system as 'critical components'.

The pump station is a super-critical component. Thus, its reliability and fail-safe features must be brought to the highest level of design and construction quality control possible. While the principal concern for failure in a gravity sewer is blockage, the list of possible malfunctions for sewage lift stations is more complex: power supply failure, electrical failure of motor and controls, mechanical failure of motor (bearings) and pump, and failure of alarm system.

Pump Station Design Criteria: What Is Important?

If you have ever had occasion to select a pump (besides the transfer pumps for the winery), your introduction to pump manufacturers' catalogs was probably a confusing experience. Pump characteristic curves, which are the major percentage of bulk in a pump catalog, allow you to select a pump that will deliver the proper rate of flow against the vertical lift (in feet) plus pipe friction loss (expressed in feet) at the maximum efficiency. The latter combination is called *total dynamic head*.[1]

There are certainly other considerations in the pump selection process, but their inclusion would only serve to confuse the general treatment of the subject. To their credit, many pump manufacturers' catalogs have detailed sections on design criteria and engineering data. The textual material is of course planned to lead you through a step-by-step process that will culminate in the selection of *their* pumps, which seems like a fair arrangement. They have, after all, spent at least $75 in printing costs alone for the well-prepared reference.

If you have a pump station that needs expansion or are contemplating the construction of one for your winery, it is well to have considered the implication of the following design parameters for your particular system before you talk to a consulting engineer:

1) peak flow

2) maximum total dynamic head (see footnote 1)

3) suction head, if any (flooded section preferred)

4) if wet-well system (use of submersible pump or extended shaft pump), what is the storage volume to give best operating cycle for pump or pumps? (2–4 min./cycle for small systems)

5) if existing or planned, does a two-pump or duplex pump system with a duplex controller provide for more system reliability?

6) are there economic and operational advantages to selecting a prefabricated system, including the containment structure and all electrical controls (dry pit or wet pit)?

7) would an emergency overflow to 2- to 3-day storage vault be a desirable safety feature in an area where power failures are frequent?

8) odor control for near-winery pump station locations (hydrogen peroxide or other contraseptic chemical additives)

9) if a new system, can it be expanded to meet increased flow for added winery production capacity?

10) alarms: remote, audio, and visual?

Your principal concern in the selection of the final pump station design configuration should be reliability to preclude the possible failures cited in the opening paragraph. Of secondary and related importance are ease of access, space, and safety features provided for routine cleaning, maintenance, and repair.

A small but important pump station feature can be a sump in the machinery spaces and a small sump pump to keep the mechanical/electrical spaces dry. A slowly-leaking packing gland on a pump can provide a dangerously wet floor for maintenance personnel. Exhaust vents

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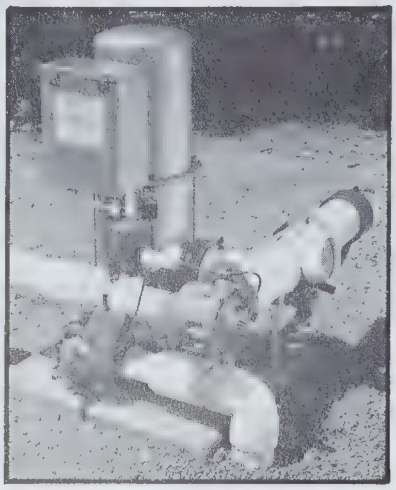

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and blowers are likewise an inexpensive but important part of a safe working environment.

Pump Station: The Heart of the Wastewater System

While the package pump station sounds like a simple and straightforward way to achieve an instant solution to wastewater lift problems, you should recognize that with the complete system, all the controls and ancillary mechanical and electrical components will be the choice of your manufacturer and not necessarily readily substituted without losing some cost advantage.

In other words, if a composite system was designed with each element of the system selected by the designer for its functional role and equally for its reliability (not necessarily price), the total design package might give better performance over the life of the pump station. This assumes that great trust and confidence be placed in your designer/consulting engineer. It is his experience and knowledge of the operational history of all the parts of the system that make his judgments valuable, and hopefully result in fewer dollars spent by the winery during the life cycle of the individual parts.

Coronary Failure: Pump Station Down

If the pump station alarm system works as designed, ideally an audio signal should be transmitted to the winery maintenance person who can effect repairs or deal with the emergency until repairs are made. Here is where the stand-by emergency overflow vault pays for itself in buying some extra time while the malfunction is located and the replacement parts, if necessary, are procured.

A previous *PW* column on winery wastewater system maintenance tips suggested that somewhere a master reference list on critical system components be kept in a 3-ring binder with procedures outlined on 'what to do when' and whom to call.

If the alarm system gives a false signal some night and it turns out to be only a palpitation and not a coronary occlusion, take two aspirin, return to bed, and call the pump doctor in the morning for a full pump station physical.

David Storm is a consulting sanitary engineer and owner of Winters Winery.

[1] 'Head' is the convenient term in feet for expressing all of the energy components in the hydraulic engineer's all-powerful Bernoulli Equation (pressure head, velocity head, and elevation head or lift).

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Free Run

Don Neel

We have made an important addition to our name. In respect to the grapegrowers who perform a major role in wine quality, we have added the word **VINEYARD** to our name **PRACTICAL WINERY**.

Possibly even more important is the redesign of our logo. The logo not only gives **WINERY** and **VINEYARD** equal importance but the typography of **PRACTICAL** expresses our progressive editorial attitude.

We have striven to deliver the most up-to-date, useful, dependable, in-depth information for grapegrowers and winemakers as well as those who sell wine. We promise to keep doing so!

You may have noticed design changes within the magazine. There will be more, as we want to keep improving our format to make it more useful to you, our readers. We hope you like the improvements we have made and look forward to continuing to provide you with ideas that you can use in every issue.

We do not intend to change our editorial slant, but will cover more and more topics of interest to our readers. If we have not covered a topic of interest to you, please let us know!

We have enjoyed serving the grape and wine industry for eight years and are grateful to your increasingly strong support. We are optimistic concerning the industry's future and look forward to providing valuable information to all segments, from grapegrowing to winemaking to marketing.

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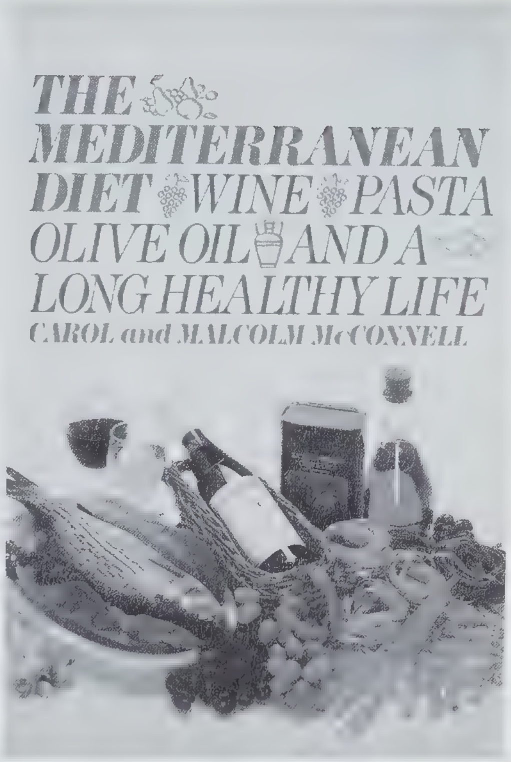
See page 49.



THE MEDITERRANEAN DIET WINE PASTA OLIVE OIL AND A LONG HEALTHY LIFE
CAROL and MALCOLM McCONNELL

Book Recommendation
The Mediterranean Diet
Carol and Malcolm McConnell
W.W. Norton & Co., Inc., New York; $16.95; 204 pages

This very readable and well-researched book is highly recommended for every winery, and winery tasting rooms should make copies available to consumers. The book offers an optimal nutrition plan based on wine, pasta, and olive oil for a long, healthy life.

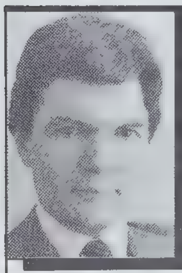
The McConnells offer a summary of research on Mediterranean villagers whose diet has shielded them from heart disease and cancer, the 'diseases of affluence'. The diet includes wine consumed daily in small quantities, whole grains (usually bread or pasta), olive oil, dark green vegetables, fruit, garlic, and onions.

The foundation of the Mediterranean Diet is:

- Grains and cereals, which inhibit intestinal cancer.
- Olive oil, which promotes cardiovascular health.
- Grapes and wine consumed with meals, which stimulate a vital digestive hormone.
- Seafood, which can lower serum cholesterol.
- Fruits, vegetables, and beans, rich in beta-carotene, which offers protection from many cancers.
- Garlic and onions, which, when consumed regularly, can reduce serum cholesterol.

Advice is given on incorporating the delicious, protective diet into daily life, along with menus and recipes with clear cooking instructions.

The Winegrowers of California contributed to the preparation of the book and the Wine Institute endorses the book.



The Wine Lawyer

R. Corbin Houchins

Wherefores and Wheres of Geographical Brand Names

Many brand names proclaim the location of the brand owner, with a strong indication that the product is made there.

How significant is that to the consumer? Would it be misleading to make "Chicago" brand roller skates in Taiwan? What about "French" brand perfume, manufactured in Hoboken, NJ?

When Deception Matters

General trade practice law says that the package may not be offered for sale if it creates a net impression that is false with respect to a matter which a consumer would take into account in deciding whether to buy.

Although as a matter of logic, the brand name is not the appellation of origin, and there would therefore be nothing literally false about an enological equivalent of French brand perfume from New Jersey, the law does not permit marketers to ask of consumers such fine distinctions.

For more than merely historical reasons, we expect our Château Margaux brand wine to come from the Margaux commune of the Médoc. Under the law applicable to consumer goods generally, a line of copy stating "French Table Wine" in place of "Appellation Margaux Contrôlée" would not justify substitution of vin ordinaire.

Special Rules for Wine

But wine labels are not judged by the general law of packaged consumer goods.

With Repeal, the federal Congress decided to write provisions into the law of alcoholic beverage labelling prohibiting 'deception of the consumer' and requiring 'adequate information' about the identity and quality of products.

Whether or not it was a good idea to add another layer of prohibition of misleading labels to the law, those provisions are with us, along with a requirement that the labelling rules adopted by the Bureau of Alcohol, Tobacco & Firearms (BATF) carry out their purpose. The rules attempt to deal with a variety of potentially misleading labelling practices, including geographically mis-descriptive brand names.

Legal Significance of Brand Names

Domestic wines labelled pursuant to regulations of the Bureau (known as "Regs 4," after part 4 of chapter 27 of the Code of Federal Regulations) must bear a brand name. Even if the marketer believes it is no-brand wine, BATF will identify some label element as the brand designation—if nothing else, the bottler mandatory.

Since their inception, the BATF rules have prohibited brand names which create erroneous impressions as to origin.

Historically, the Bureau has in effect recognized in practice, at least, five categories of brand names:

1) those which do not create an impression or inference of origin,

2) those which do, but not erroneously,

3) those which would create an erroneous impression of origin but for the addition of the word 'brand',

4) those which would create an erroneous impression of origin but for the presence of other material on the label,

5) those whose erroneous impression of is so strong that neither the word 'brand' nor any other label material is sufficient to dispel it.

Recent legal developments have changed the rules a bit—both the written regulations and the practice. It may be useful, therefore, to look anew at the issue of geographically significant brand names.

Recent Developments

The Wawskiewicz case, a 1981 decision of a U.S. Court of Appeals, had much to say about varietal labeling and other consumer scandals. The same opinion contains a short passage which criticizes the Bureau's failure to include regulation of corporate and trade names of geographic significance.

Whether the judicial criticism was a factor is unclear, but in 1984 the Bureau published proposed rules with a fairly draconian recommendation regarding geographic brand (but not corporate or trade) names. A somewhat milder form of the proposal was adopted and has been part of the regulation since July 7, 1986. Its effect in practice is now coming to be known.

Analysis Under New Regulations

The new regulation, which is part of Regs 4, § 39, involves a multi-stage analysis which runs more or less like this:

1. *Does the name have viticultural significance? If no, return to the general rule of brand names (Regs 4, § 33), with its five categories noted above. If yes, go to step two.*

The regulation states that a name has 'viticultural significance' if it is the name of a state or county which has been approved as a viticultural area under Regs 9, or a state, county or the foreign equivalent of a state or country which BATF decides to include in the definition.

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In the context of the new rule, that latter wild-card is not as broad as first appears, because the new regulation itself indicates that an area of viticultural significance has requirements for use as an appellation of origin. Thus a brand name indicating a place that lacks such requirements could not properly be treated under § 39.

Defining viticultural significance raises interesting questions. "Napa Valley" brand obviously has it. Would "Napa Hillside Winery" brand? Or "Napa Cabbage?" Logic suggests that the latter two brand names should be treated under § 33, not § 39, for no appellation of origin requirements exist for either. The practical difference in result will become clear by step four, below.

2. *Does the wine meet the appellation of origin standards for the geographic area named? If so, the brand name is permissible. If not, go to step three.*

3. *Was the brand name used in a BATF certificate of label approval issued before July 7, 1986? If not, the brand name is not permissible. If so, go to step four.*

Note that this preserves the right to transfer brands and trademarks, since the prior use does not have to be by the current applicant for label approval.

4. *Does the wine have as appellation of origin of a state or smaller? If so, go to step five. If not, go to step seven.*

At this point, the practical difference between §§ 33 and 39 is evident. Under § 33, the Bureau may find that the label is in category 3 or 4, above, even if it has an appellation larger than a state or no appellation of origin.

More importantly, the ability to 'save' an otherwise misleading brand name by adding other material under § 33 is not restricted by a cut-off date, while the similar possibility under step seven, below, is available only for 'grandfathered' brands. Hence the crucial importance of determining what names have viticultural significance.

5. *Is the area to which the brand name refers a state? If so, the brand name is permissible. If not, go to step six.*

6. *Is the wine labelled with an appellation of origin of a county or viticultural area? If so, the brand name is permissible. If not, go to step seven.*

7. *Does the label contain some statement in addition to the brand name which BATF believes is sufficient to dispel the impression that the geographic brand name indicates the origin of the wine? If so, the label is permissible. If not, go to step eight.*

On the issue of what other statements will suffice, BATF seems to have drawn a rather odd conclusion from the comments by some industry observers that the word 'brand' alone may not always be sufficient. Although the rule does not say so, the Bureau has said that it will not permit the word 'brand' on labels treated under the new provision of § 39, as if that word were a source of deception in itself.

Rather obviously, the fact that it may not be sufficient does not prove that it is unhelpful, so one hopes that the Bureau will give due consideration to all statements that may dispel a misleading impression, including those which rely in part on adding 'brand' to the brand name.

8. *Do you want to fight BATF? If not, pick another brand name. If so, ask yourself if the Bureau acted arbitrarily in making any of the key determinations, such as determining capriciously that a brand name is of viticultural significance or refusing to accept a label statement which clearly would eliminate any deceptive tendencies.*

At this point, the decision process is too individual and involves the interplay of too many personal, business and economic decisions to reduce to an outline. It may, however, be interesting to look at two applications of the new rule.

Your Label is as Important as Ours...
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The Rule in Practice

The Bureau has said that it will consider each brand name on a case-by-case basis.

That kind of statement is frequently heard from governmental agencies. It may express a sincere desire to act fairly, but from a legal standpoint, it represents one of the great frustrations of administrative practice: the agency, in effect, exercises judicial power, but does not want to face the fact that the process of rendering decisions on the application of a law requires consistency and predictability of result.

Two cases that were in the news when this column went to press illustrate how the Bureau is approaching the threshold question of whether the name is of viticultural significance.

Key Words

In one label approval decision, BATF ruled that the full exact name of a viticultural area, bracketed by "The" and "Vineyard," resulted in a brand name of viticultural significance. In the other decision, it said that taking a key word from a fairly long viticultural name and combining it with "Vineyards" produced the same result.

How is the Bureau able to find that brand names that merely include the name of a viticultural area, or even a part of the name, have viticultural significance, when the definition in the new rule says a name has viticultural significance when it "*is* the name" of such an area?

Logic is with the BATF this time, since the rule does not say "when and only when." It states a case that is sufficient, but does not say that other names may not have viticultural significance as well.

In essence, the state of the law at the administrative level is that if the Bureau should add "North Dakota Red River Valley" to Regs 9, one could not adopt "Red River Vineyards" as a brand name without complying with § 39.

Future Application

Modern marketing relies on coined words with more or less obvious suggestions of significant places. Would a "Sonovalley" brand fall under § 39? How about "Sovalle?"

Questions such as what words or even parts of words would be key will continue to be answered case by case, but in time we can hope that a coherent body of precedent, useful for the kind of decision-making that is necessary to the industry, will develop.

Curative Statements

Decisions on the other end of the issue—what 'other statement' will be accepted under § 39 as dispelling the misleading tendencies of a geographic brand name—will likely be more difficult to predict.

Probably the best thing the Bureau could do from an industry standpoint would be to adopt the misleading net impression test that is used for other packaged goods. Though itself necessarily somewhat vague, it has been around long enough to become familiar and would offer a measure of predictability and (may one dare hope?) consistency with the mainstream of modern commerce.

Future Brand and Area Names

To close on a note of caution, there is clearly a warning here about the adoption of more viticultural areas under Regs 9.

Any winery with a current or potential brand name incorporating part of a viticultural area name is likely to find itself facing restrictions on where it can get its grapes. Future expansion into state appellation wines could cause real problems, so some forethought before adopting a brand name or filing a Regs 9 petition is in order.

Photography Lloyd Liebes, Jr

July 24–25, 1987

American Society for Enology & Viticulture Eastern Section

The 12th Annual Meeting of the American Society for Enology & Viticulture/Eastern Section (ASEV/ES) will be held at The Corning Hilton Inn, Denison Parkway East, Corning, NY 14830 (phone: 607/962-5000).

The activity program will include technical papers on viticulture and enology, exhibits by industrial suppliers, and technical wine evaluation sessions. In addition, a full-day sensory evaluation workshop and a round table discussion of the ethyl carbamate situation are planned.

Oral presentations will include:

–Relationship of chemical composition to quality of Ohio wines.

–A pattern recognition study of the sensory evaluations of Pennsylvania Vidal Blanc wines.

–Heat-induced modification of odor-active volatiles in extracts of New York grape cultivars.

–Multi-variate analysis of charm responses from 12 New York grape cultivars.

–Determination of the phenolic composition of Pennsylvania Vidal Blanc wines.

–Ascorbyl decanoate: a potential new preservative to replace sulfur dioxide in wine.

–Use of gibberellic acid to induce seedless fruit development in Minnesota grapes.

–Phage interference in malolactic fermentation.

–Spoilage of wines by lactic acid bacteria.

–Microbial growth during carbonic maceration of DeChaunac grapes.

–Characteristics of New York wine grapes for use in processed grape juice.

–Use of honey in the winemaking process.

–Selective cryo-extraction.

–Hydrolysis of sucrose in eastern table wines.

–Effect of ultrafiltration on composition of wine.

–Use of ultrafiltration in the processing of Muscadine and hybrid wines.

–Anthocyanins in the identification of grape cultivars.

–Effects of gibberellic acid (GA_3) and Silaid (CGA 15281) as cluster-thinning agents for Seyval grapevines.

–Effect of clone and rootstock on composition and quality of White Riesling grapes and wine.

–Effects of rootstock and levels of nitrogen and potassium in the nutrient solution on growth and mineral element composition of 'Suffolk Red' grapevines.

–Survival and recovery of *V. euvitis* and *V. rotundifolia* grapevines from stress caused by the inclement winter of 1984-85 in Orange Co., NC.

–Effect of rootstock on cold hardiness of Seyval grapevines.

–Effect of different must treatments on Muscadine juice quantity and quality.

–Production, storage stability, and sensory quality of white Muscadine grape juice.

Many of the New York Finger Lakes wineries are within about an hour's driving distance from the Corning area. Further details on the meeting can be obtained by contacting the Secretary of the Section, care of ASEV/ES, Department of Food Science and Technology, NYSAES, Geneva, NY 14456-046.

September 14–17, 1987

Assoc. of Official Analytical Chemists 101st Annual Int'l Meeting/Exposition

The 101st meeting of the AOAC will be held at the Cathedral Hill Hotel, San Francisco, CA. The spotlight will be on robotics.

Five symposia are scheduled to provide current information in the areas of robotics, biotechnology, industrial analytical chemistry, mycotoxins, and cholesterol oxides. Presentations in the area of robotics include: achieving success in laboratory robotics; secrets of a contract lab; automated HPLC sample preparation and analysis using laboratory robotics; and laboratory automation.

In industrial analytical chemistry, there will be the following presentations: a fast enzymatic method for determination of ethanol in alcoholic products; gas chromatographic determination of ethyl carbamate in alcoholic beverages with confirmation by gas chromatography/mass spectrometry; the aeration-oxidation method for determination of sulfur dioxide in wine; and a rapid method for determination of ethyl carbamate in alcoholic beverages.

The meeting will also feature a trade show of over 80 exhibitors, and a social program. For more information, contact AOAC, 1111 North 19th St., Ste. 210, Arlington, VA 22209 (phone: 703/522-3032).

January 12–15, 1988

Second International Symposium for Cool Climate Viticulture/Enology

The New Zealand Society for Viticulture and Oenology invites winemakers, grapegrowers and others involved in wine production and marketing to attend the Second International Symposium at the Kingsgate Center, Auckland, New Zealand.

The symposium will concentrate on quality wine production from classical varieties in cool regions. Speakers from around the world will present their latest results. Oral presentations and poster presentations will cover the following topics:

–Winemaking in the vineyard: What to plant and where; how to control vigor; how to manage dense canopies; avoiding pests and diseases, including organic viticulture; assessing a wine grape harvest and quality.

–Winemaking in the cellars: Production of botrytised wines, sparkling wines, Chardonnay, Bordeaux Reds, Pinot Noir, Sauvignon Blanc; primary fermentation; malolactic fermentation and stabilization; yeast technology; avoiding must contamination; wine flavors and aromas; and appropriate use of wood.

–Wine and society: Wine and governments–appellation, ingredient labeling, and health; wine marketing, wine journalism, and wine shows. A 9-day tour from Auckland to Christchurch is available following the Symposium. The tour will include Auckland wineries and vineyards, Te Kauwhata Research Station, Rotorua's thermal areas, and visits to the wine producing regions of Gisborne, Hawkes Bay, Martinborough, and Marlborough. A 1-day seminar, 'The Establishment of New Viticultural Regions', is scheduled for Monday, January 25, at Lincoln College in Christchurch.

For further information, write to the Symposium Secretary, P.O. Box 39-099 Auckland West, New Zealand. OR contact *PRACTICAL WINERY* for details on a group air fare departing Los Angeles Airport January 9, 1988.

Symposium on Grapevine Canopy & Vigor Management

PROCEEDINGS

A symposium entitled 'Grapevine canopy and vigor management practices for improvement of vine microclimate and grape and wine quality' was held in August, 1986, in conjunction with the XXII International Horticultural Congress at UC Davis in California.

Proceedings of the symposium are currently available for distribution. They are published in Acta Horticulturae #206, 'Symposium on Grapevine Canopy and Vigor Management', and can be obtained by writing International Society for Horticultural Science, De Dreijen 6, 6703 BC Wageningen, Netherlands. The price of the proceedings is $24. Those who paid the registration fee to attend the symposium will receive a copy of the proceedings.

A list of papers included in the proceedings follows:

–Influence of temperature on composition and quality of grapes.

–Influence of light on composition and quality of grapes.

–Irrigation management and fertigation to optimize grape composition and vine performance.

–Experiences on the effect of vine spacing and trellis-training system on canopy microclimate, vine performance, and grape quality.

–Usefulness of growth regulators for controlling vine growth and improving grape quality in intensive vineyards.

–Usefulness of rootstocks for controlling vine vigor and improving wine quality.

–Interactions 'training system X soil X rootstock' with regard to vine ecophysiology, vigor, yield, and red wine quality in the Bordeaux area.

–Effectiveness of shoot topping and leaf removal as a means of improving quality.

–Influence of hedging and leaf removal on canopy microclimate, grape composition, and wine quality under California conditions.

THE CHALLENGE OF Zinfandel

Rhoda Stewart

Part II

Origins a Mystery

How Zinfandel came to the U.S. is still a mystery. Viticultural historian Charles Sullivan has shown, in his story 'Zinfandel: A True *Vinifera*' (*The Vinifera Wine Growers' Journal*, summer 1982), that Zinfandel first arrived on the east coast as early as 1832, where it was grown under glass for table use. At that time, it was known as Black St. Peter's as well as Zinfandel (and variants of this word).

As a wine grape in the U.S., the first known plantings occurred in California, near San Jose and in the Sonoma and Napa Valleys in the 1850s, from cuttings brought from east-coast nurseries by west-coast nurserymen and other agriculturists. Some of the cuttings were called Black St. Peter's; some, Zinfandel or one of its variants. Although no one ever specifically analyzed these two grapes to prove they were one and the same, all descriptions of each have been 'consistently similar'.

Between 1859 and 1861, the merits of Zinfandel (the favored name) over Mission as a superior claret grape was recognized by nurserymen, agriculturists, and wine connoisseurs throughout the San Francisco Bay area. By 1860, Zinfandel had caught on in the Sacramento area, and in the Sierra foothills by 1865. By 1880, Zinfandel had supplanted Mission as the most widely planted red wine grape in California—and it was the first premium *vinifera* to be widely cultivated as a wine grape in the U.S.

Data on Zinfandel's European origins are still scanty. There is a description of a West St. Peter's grown in London's Kew Gardens from seed by a Daniel West in 1775 that uses terms very similar to those used for Zinfandel. But there is no record of its ever being called Zinfandel.

Although the Primitivo of southern Italy's Puglia province has been proven identical to Zinfandel, there are no records of its being grown in Italy before 1850.

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has books on grapegrowing and winemaking ready for shipment to you. See Order Form on Page 47.

Just how Zinfandel came to the U.S. remains to be discovered. But perhaps Daryl Sattui of V. Sattui Winery, St. Helena, CA, sums it up best: "Well, I'll be. . .! An English grape?"

Fetzer Vineyards

Paul Dolan, winemaker for Fetzer Vineyards, Redwood Valley, Mendocino County, finds soil type as important as age of the vines for flavor intensity in Mendocino Zinfandel. Red clay benchlands and well-drained gravel, shale, or decomposed, friable red rock hillsides are best.

Fetzer Vineyard produced its first varietal Zinfandel in 1968, and has produced Zinfandel every year since. Up to 1983, Fetzer produced a vineyard-designated full-bodied Zinfandel from each of its growers. Beginning with the 1984 crush, Fetzer began giving vineyard designation only to the Ricetti Vineyard. Grapes from other growers are used in a Mendocino Reserve Zinfandel.

Wine Style

Dolan describes Fetzer Mendocino Zinfandels as having a hard, briary fruit aroma, with strong spicy wood and hints of black pepper. The grapes are high in tannins, which are downplayed in fermentation because they would overpower and outlive the fruit. Both the Ricetti Vineyard Zinfandel and the Reserve Zinfandel are usually under 14% alcohol, with acid in the finished wine between 0.70 and 0.74 g/10mL. The pH is around 3.45. These wines are at their best, Dolan feels, in about six years. Beyond six years, the fruit starts to diminish.

Longer-ageing Zinfandels have been produced from Fetzer's Mendocino vineyards, vintages that age to 10 years, with every indication of holding up longer without losing the fruit. "But these are rare years," said Dolan. "They are years when you get full ripeness without a lot of raisining. Such wines usually end up over 14% alcohol, and can go as high as 15%, but without a raisiny quality.

"You have the fruit along with the acids, tannins, and extract necessary for the wine to gain in the bottle several years." Dolan cites the 1977 and 1978 Lolonis as two vintages with these exceptional qualities. With 15% alcohol, both are holding up beautifully without losing their fruit. In less exceptional years, he feels Zinfandel is best when harvested for under 14% alcohol, and with only 2–4 years in the bottle.

Fetzer's vineyards are 30-year-old dry-farmed vineyards on the above-mentioned soil types, together with some 10-year-old vineyards with budwood from the 30-year-old vines. These vineyards are kept completely weed-free by cross-cultivation. Because of a dry climate, they require only light sulfuring.

For the 1985 vintage, grapes were harvested when the field sample was 21.5° Brix, which climbed to 23° in the tank. Harvest began around September 20, and lasted for one week. "Selecting harvest dates for Zinfandel means being in the vineyards daily," said Dolan. "It's always difficult to determine when to pick this varietal." Dolan also relies on the flavor and taste of the fruit for selecting the harvest date. "Fetzer is not a 'high-tech' winery. Almost all our quality control is done by taste."

Paul Dolan

fetzer
1983
special reserve
mendocino
Zinfandel
produced and bottled by fetzer vineyards
redwood valley, california, u.s.a. alcohol 13.5% by vol

Winemaking

Zinfandel is fermented on the skins for only 3–4 days, to control tannins. The wine is taken off the skins between 1° and 2° Brix. Press wine is combined with free run. The wine is left in tanks for 6–8 weeks, and racked 3–4 times. Natural malolactic fermentation takes place during this time.

Zinfandel is aged in Kentucky Blue Grass American oak barrels of a variety of ages, in order to avoid over-oaking delicate fruit flavors. Both the Ricetti and the Reserve Zinfandel are aged 14–16 months in oak and are racked twice in this interval. Fetzer Vineyard has begun adding French oak to its American oak cooperage. The French oak will not be significant, however, until the 1987 vintage. Fetzer Zinfandels receive an egg-white fining and one filtration prior to bottling.

Fetzer Vineyard also makes a Lake County Zinfandel, which Dolan describes as a light- to medium-bodied claret-style Zinfandel with lots of fruit and spice. "Fresh and drinkable upon release, it is a good seller," says Dolan. Zinfandel from Lake County has bigger, less tannic and less intensely-flavored berries. The same winemaking is practiced for the Lake County Zinfandel as for the Mendocino Zinfandels, except that it is aged in oak for only 9–10 months.

In 1985, Fetzer Vineyard produced 20,000 cases Lake County Zinfandel, 3,000 cases Mendocino County Reserve, and 1,000 cases Ricetti Vineyard Zinfandel.

Tasting Notes:

Fetzer Ricetti Vineyards 1977

Color/Aroma: Medium-dark ruby; forward, fruity aromas, raspberry, spice.

Flavors: Chalky, tannic burn, dill, some berry, earthy.

Balance/Finish: Tannic, astringent.

Fetzer Special Reserve 1984

Color/Aroma: Light red; raspberry, berry, cherry.

Flavors: Berry, raspberry, spice.

Balance/Finish: Slightly bitter, good tannin/fruit balance.

Kendall-Jackson Vineyards & Winery

Jed Steele, winemaker for Kendall-Jackson in Lakeport, has been making vineyard-designated Zinfandel from three vineyards on Mendocino's southwestern ridges for 13 years—since his days with Edmeades Winery, Philo. The vineyards are the 70-year-old, 6-acre DuPratt-DePatie Vineyard; the 80-year-old, 2-acre Zeni Vineyard; and the 90-year-old, 9-acre Ciapusci Vineyard. In addition, in 1983, he began buying from the new, 12-acre Mariah Vineyard, planted in 1980 by U.C. Davis graduate Dan Dooling. The vineyards range in elevation from 1,400–2,400 feet.

The old vineyards were put in by Italian immigrants whose customers were Mendocino County loggers. With the demise of the logging industry, many of the 400 acres of vineyard in this region (which were primarily Zinfandel) fell to ruin. However, home winemakers (and the sentimental attachment of the growers) provided enough demand to have kept a few of the best acres alive and productive.

Grapegrowing

Crop size from the old vineyards is low—1 to 2 tons/acre. Controlling both crop size and bunch rot in the Mariah Vineyard, however, has required special viticultural practices.

To control bunch rot, this vineyard has been changed from head-pruning to trellising with cordons. The soil is virgin agricultural soil, having been cleared of huge Douglas fir and redwood before planting. In addition, the region gets between 75 and 100 inches of rain annually. The heavy rainfall and fertile soil, together with Zinfandel's natural propensity to vigorous growth in its early years, produce heavy foliage—too much to be controlled by head-pruning.

To limit crop size, the vines are severely pruned, and much of the second crop is removed at veraison. Both removal of foliage to provide for air movement, and removal of second crop, are more effective in the Mariah Vineyard with cordons.

Steele likes these vineyards because, "the coolness of the region from the ocean influence and the lack of valley fogs, which seldom reach these mountain vineyards, makes for an October harvest with minimal raisining. There is some characteristic uneven ripening with Zinfandel in these vineyards, but the coolness makes it less problematic.

"The grapes normally have very high acid (1.1–1.4 g/100mL) and low pH (3.0–3.1). However, in some years acidities reach the 1.6–1.9 range, with pHs as low as 2.85. Since much of the total acid is malic, this combination of high acid/low pH and minimal raisining produces Zinfandel with lush, clean fruit flavor and good ageing potential."

When asked if he felt his Zinfandel, because of the low percentage of shrivelled fruit, was less rich in extractions necessary for a full-bodied, long-ageing claret, Steele replied, "No, I don't agree that you need a lot of shrivelling to get a rich, full-bodied, fruity wine. The fresh, lively, clean fruit flavor in these Zinfandels is the opposite of the raisiny character that can accompany high ripeness from some other regions."

The alcohol in Steele's Zinfandels are 12.5–13.8%. The wines are in the Cabernet/claret style, and some years' vintages are lighter than others. Yet the grapes are picked at a higher Brix than most who make regular-harvest, claret-style Zinfandel—23° to 24° based on a 100-berry sample.

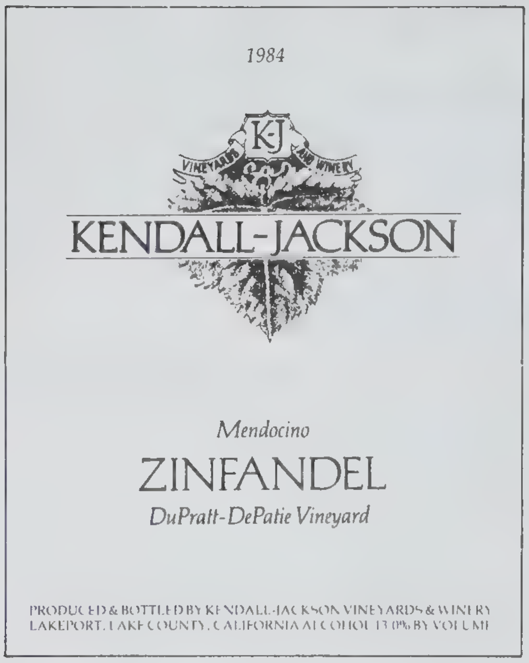
Winemaking

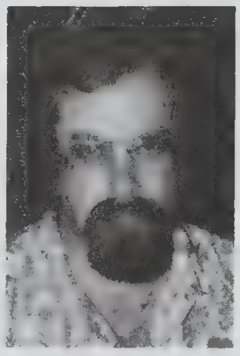
The must is inoculated with Montrachet or Pasteur Red yeast, then fermented warm, between 85° and 95°F (juice temperature), in closed-top stainless steel tanks; small lots are fermented in open fermenters. Frequency of pump-over depends on the vintage, but on average is 1–2 times/day. The must is pressed when it is between 5° and 0° Brix.

After primary fermentation, the wine is racked into stainless steel tanks, where it completes malolactic fermentation—which can often take many months due to the high malic content and low pH. Steele has used a variety of malolactic bacteria through the years, and is presently using Micro-Life Technics active-dry preparation.

When malolactic is completed, the wine is fined and loosely filtered. The wine is aged in Nevers oak barrels, of which ½ to ⅓ are new, for 6–12 months, and is racked 2–3 times.

At the end of barrel ageing, the wine is polish-filtered and egg-white-fined. Kendall-Jackson's 1985 Zinfandel production was 3,500 cases.


1984
KJ
VINEYARD AND WINERY
KENDALL-JACKSON
Mendocino
ZINFANDEL
DuPratt-DePatie Vineyard
PRODUCED & BOTTLED BY KENDALL-JACKSON VINEYARDS & WINERY
LAKEPORT, LAKE COUNTY, CALIFORNIA ALCOHOL 13.0% BY VOLUME



Jed Steele

Tasting Notes:

Kendall-Jackson DuPratt-DePatie Vineyard 1984

Color/Aroma: Dark red; spicy, peppery, raspberry, brambleberry.

Flavors: Raspberry, black cherry, oak.

Balance/Finish: Rich, long finish, medium body.

Kendall-Jackson Zeni Vineyard 1985

Color/Aroma: Red; herbaceous, strawberry, spicy, earthy.

Flavors: Fruity, minty, toasty.

Balance/Finish: Lively, long finish.

Amador Zinfandel

Shenandoah Valley, Amador County, CA, is just three miles wide by six miles long, at 2,000-foot elevation. Such elevation puts it, most of the time, above the daytime fog line, giving it an extraordinary number of sun days, which contribute to the high sugar and lush flavors characteristic of Amador Zinfandel. The elevation is also responsible for a cooling nighttime breeze, which is conducive to production of acid levels of 0.65 g/100mL and higher.

The soil consists of non-compacted decomposed granite. The chief supply of nutrients lies well below the topsoil (which varies vineyard to vineyard from 2–20 feet deep). Annual rainfall is normally about 36 inches. Zinfandel in Amador County is on rooted cuttings. Established vineyards are dry-farmed. Since the drought of 1976-77, drip irrigation has been installed for some new plantings to help the cuttings get established.

Thus, vines struggle to put down deep roots, for nutrients as well as for moisture. Such struggle limits yields to 1.5–3.5 tons/acre, depending on topsoil depth and age of the vines. From such low yields comes the famous intense flavor of Amador Zinfandel.

Post-Repeal commercial appreciation of Amador County Zinfandel began with Charlie Myers, owner of Harbor Winery (founded 1973), Sacramento, CA. Myers, as a home winemaker, got his first glimpse of Amador Zinfandel while picking up some Muscat Alexandria from the Deaver Ranch, Shenandoah Valley, in October 1963. Myers didn't immediately recognize the grapes as Zinfandel, he said, because they were "much darker, much cleaner and looser in the bunch than flatland Zinfandel." Impressed with the appearance and taste of these grapes, Myers crushed his first Amador Zinfandel from Deaver Ranch fruit in 1965.

Upon bottling in spring 1968, Myers gave some to Darrell Corti, a Sacramento wine merchant. Corti was so impressed with Myers' wine that he offered some to Bob Trinchero, proprietor of Sutter Home Winery, St. Helena, CA, as Trinchero had expressed a need for a grape that was both cheaper than Napa Valley grapes, and that would give him a competitive edge in the wine market.

Trinchero, in turn, was sufficiently impressed with both Myers' wine and the price of the grapes ($75/ton) to sign a contract with Deaver for 20 tons. The next spring, he signed for 30 tons; by 1970, he was buying Deaver's entire crop—and has continued to do so ever since.

Sutter Home's 1968 vintage, made from fruit delivered at about 30° Brix, was a mouth-filling tannic wine with a distinctive ripe, pruny flavor—and alcohol over 15%. Says Trinchero, "It was the best wine I'd ever made. It was unbelievable. And so was its reception." Sutter Home's 1968 Amador Zinfandel took first place at a Berkeley Wine and Food Society Zinfandel tasting upon its release in January, 1971, and sold out quickly. Shortly after this first Amador release, Sutter Home Winery changed from a multi-varietal winery to one specializing in Zinfandel.

While a few wineries such as Ridge, the original Souverain (Napa Valley, under Lee Stewart), David Bruce (Los Gatos), Martini, Swan, and Pedroncelli were making Zinfandel clarets in the 1950s and 1960s, it was Sutter Home's Deaver Ranch Zinfandel that caught the attention and fired the imagination of a wide range of commercial winemakers and consumers.

Of the four main regions that are best suited to Zinfandel, Amador County presents somewhat more complex regional problems than do the other three. The extraordinary number of very warm, dry days and cool nights that contribute to Amador Zinfandel's flavors and acids at the same time contribute to sudden and excessive unevenness in ripening during the fruit's last couple of weeks on the vine. During the grapes' last two weeks of ripening, the moisture reserves in the dry-farmed hillside vineyards are depleted, so the vines become severely stressed. Shrivelling begins; sugar levels rise rapidly.

Yet fully-ripe berries are necessary for the lush flavor that Amador Zinfandel became famous for. Thus, for the best wines, the berries cannot be picked before the flavor has developed—despite the tendency to raisining and high sugars.

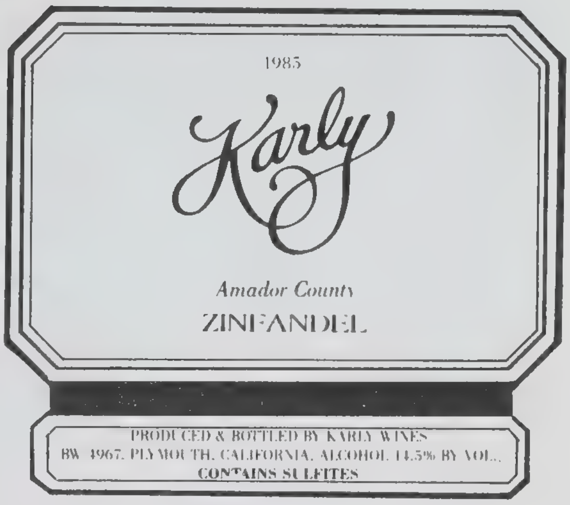
Karly Wines

Lawrence (Buck) Cobb, a former Air Force fighter pilot and Berkeley-trained nuclear engineer, came to Shenandoah Valley in 1976 with his wife, Karly, more or less to retire. But once there, his love of fine wines and the lore of Zinfandel and of winemaking worked its magic. Soon he was hanging out with his winemaking neighbors, learning all he could about Amador Zinfandel and winemaking. In 1980, he and his wife started Karly Wines.

Cobb is especially impressed with the match-up of soil, climate, and Zinfandel in Amador County. "Even in bad years," he says, "you can make a good Zinfandel from Amador fruit. Take 1983. The summer was too hot; it rained during early harvest; then it got extremely hot after the rain. The vines went into shock. The fruit hung up around 20° Brix, and ripened, finally, by burning, by drying out. Yet the 1983 Zinfandel is a good Zinfandel."

Admittedly biased towards old vines, especially the Eschen Vineyard, Fiddletown, Cobb has nonetheless experimented with young vines, and has found one 'knockout' vineyard. "It has the fruitiness, lightness, and elegance of a fine Burgundy," says Cobb. "Age of vines might not make as much difference in Zinfandel character as I had formerly thought. Today, I feel that the vineyard itself might be more important than age. The Eschen Vineyard is especially fine because, although it is dry-farmed, it is never water-stressed. That vineyard functions photosynthetically better than any other in Amador."

Buck Cobb



1985

Karly

Amador County

ZINFANDEL

PRODUCED & BOTTLED BY KARLY WINES
BW 4967, PLYMOUTH, CALIFORNIA, ALCOHOL 14.5% BY VOL.,
CONTAINS SULFITES

Wine Style

According to Cobb, each vineyard in Amador has distinctive 'fingerprints'. The first Karly Zinfandel (1980) was made with fruit from three different vineyards, and three distinct wines resulted. Since then, he has experimented with blending vineyards to produce one consistent and distinctive wine. Producing a consistent style, he feels, will be best for both the winery and his customers. Vineyards, therefore, are selected for a range of interesting contributions.

In 1983, Cobb began adding up to 15% Petite Sirah to his Zinfandel. Influenced by Ridge's York Creek Zinfandel (York Creek Vineyard has Petite Sirah planted among the Zinfandel vines), he wants to bring a new dimension to premium Amador Zinfandel.

Cobb is one among Amador Zinfandel producers who is not alarmed at the possibility of his wines going over 14% alcohol. "In fact," he feels, "to get the body, flavor, and spice that Amador Zinfandel is famous for in certain years, one has to let the alcohol go that high.

"I am not overly concerned with the possibility of excessive grape tannin extraction, either, for two reasons: Amador Zinfandel juice has tannins that soften very early; and I have a high tannin tolerance, and believe there are consumers with the same tolerance. There is a market niche for big wines left by wineries who followed the trend to lighter and 'nouveau' Zinfandels."

Winemaking

Cobb has 2,000-gallon stainless steel fermenters with removable lids. A catwalk platform encircles the top of each fermenter. This arrangement makes punching down relatively easy. The tanks are high enough to feed skins directly into a 25hL mobile tank press. Cobb believes that the crushed and fermenting must should be handled quickly and gently, and that it should not be overly-exposed to air.

To choose a harvest date, Cobb looks at taste and pH. Each vineyard achieves optimum taste with different sugar and acid values. "It takes years to acquire the palate, to know when the grapes have the taste necessary to produce flavorful wine," Cobb emphasizes. "But the taste will tell you when the grapes should be picked, and I'm starting to get the hang of it."

Cobb begins harvest countdown by closely watching his favorite vineyard, Upton, after veraison. Then, about two weeks before anticipated harvest, he guesses at the ideal date, and begins harvest with this date in mind. Appearance is closely monitored along with pH, taste, and sugar level. "The Eschen Vineyard is almost always picked slightly green—22° Brix, because that is when those grapes taste right. Another vineyard always comes in with about 10% highly-raisined clusters," Cobb notes.

Fruit is crushed in five-ton lots and is inoculated with Montrachet yeast (one kilo/1,000 gallons must). The temperature is encouraged to reach at least 85°F and stay there for 24 hours. Important flavors are extracted, Cobb feels, at higher temperatures. During this time, the must is also inoculated for malolactic fermentation. The cap is punched 5–6 times daily for about 15 minutes.

After 6–10 days in the fermenter, the must is gravity-emptied. The must, which is now between 2° and 6° Brix, is pressed hard, then is moved into stainless steel tanks, where it remains for only a few days before it is moved into French oak barrels. It often finishes fermentation in barrels. The wine remains on the gross lees until spring, unless H_2S forms.

At the end of malolactic fermentation (about June), the wine is racked and all lots are blended together. During the wine's second year in barrels, it is racked only if it develops a leesy smell.

One month before bottling, the wine is racked to tanks and analyzed and adjusted as necessary for acid, though adjustments are rare. Karly Zinfandel has never been fined. The wine is coarse-filtered to the bottle, and is held for 30–60 days before release. Cobb would like to bottle-age Zinfandel for one year before release, but, with small production and high demand, has been unable to do so.

Karly Zinfandel gains complexity in the bottle. But Cobb is not convinced that a Zinfandel's ability to gain complexity in the bottle for years is necessarily the mark of a great Zinfandel. "Ageing is not the issue," insists Cobb. "It was, after all, the English who made ageing an issue. They bought bulk Bordeaux and bottled it in Bristol. They found that it developed character and complexity over the years. In fact, ageing was usually a necessity for these bulk clarets. But the French never used to age them; and today, they still prefer to drink their wines young."

Karly Wines Zinfandel production in 1986 was 2,400 cases.

Tasting Notes:

Karly 1982

Color/Aroma: Medium ruby, slight turbidity; fruity, minty, earthy.

Flavors: Berry, minty, cherry, soft, strawberry.

Balance/Finish: Tannic, tart, long finish.

Karly 1984

Color/Aroma: Ruby; grapy, earthy, minty, pruny.

Flavors: Berry, cherry, pepper.

Balance/Finish: Soft tannins, awkward harshness.

Kenworthy Vineyards

Kenworthy Vineyards, Plymouth, was started in 1979. John Kenworthy, owner/winemaker, became interested in Zinfandel and winemaking in the 1960s as a home winemaker. By 1971, his interest had grown sufficiently for him to want to own a winery, and he began to seek property.

He first looked around Templeton (San Luis Obispo County), as he had gone to school there and knew the country. Through an Amador County resident who was related to John's wife Pat, an Amador ranch was found. Since the Kenworthys knew that Shenandoah Valley was a region especially suited to Zinfandel, they didn't hesitate to purchase the property and establish their winery.

Grapegrowing

"Early viticultural practices here," said Kenworthy, "didn't do anything to improve grape quality. Second crop was seldom removed. Such early practices enhanced the natural tendency of Zinfandel to ripen unevenly, often resulting in as much as 15–20% of the crops being overripe—even to the point of raisining. But the vines, and the region, were good; and there was good tillage. As long as the growers got good crops, and could sell them, they were satisfied.

"The presence of high proportions of very ripe fruit produces very rich, full-flavored *young* wines. But they tend to be excessively tannic. Sadly, these very qualities that tend to produce young wines that some found attractive also produce oxidized and unstable wines, characteristics which tend to limit greatly the long-term development potential of the wine. When these rich, ripe flavors fade, there's not much left except tannin."

Kenworthy Zinfandel is made from younger Shenandoah Valley vines. "I think the emphasis on old vines is often exaggerated," he said. "Let's face it: there aren't that many old vines still producing. Zinfandel producers will have to adapt to using fruit from younger vines to meet the increasing demand for red wine."

To improve intensity of flavor and overall fruit quality, Kenworthy likes to prune poorly-positioned canes by crown-suckering. This opens the central part of the head foliage. Severe cane thinning is employed and with proper pruning and thinning, second crop does not need to be removed. The foliage-to-fruit ratio is important, as this affects acid/pH relationship.

Winemaking

Fruit is picked when sugar levels are 22–23° Brix. TA averages 0.85 g/100mL, with 3.4 pH. Picking begins at 6:30 a.m. and stops around 9:00 a.m., depending on the temperature of the day, to keep the fruit under 65°F. To further control temperature of the picked fruit, it is field-crushed in a 3-ton field crusher. The first load comes in at about 60°F; the second, from grapes that had been stacked under some "favorite oak trees" as they were picked, comes in at 65°F. Once the crushed fruit is in the open-top stainless steel fermenter, 50 ppm SO_2 is added. The must rests overnight, before inoculation with Montrachet yeast the following morning.

The must ferments slowly, with the temperature rising to about 90°F by the third or fourth day. To prevent it from going higher, a garden soaker hose is wrapped around the tank, if necessary. The high of 90°F is maintained for 24–36 hours, by which time the fermentation begins to taper off, and the temperature drops to about 85°F.

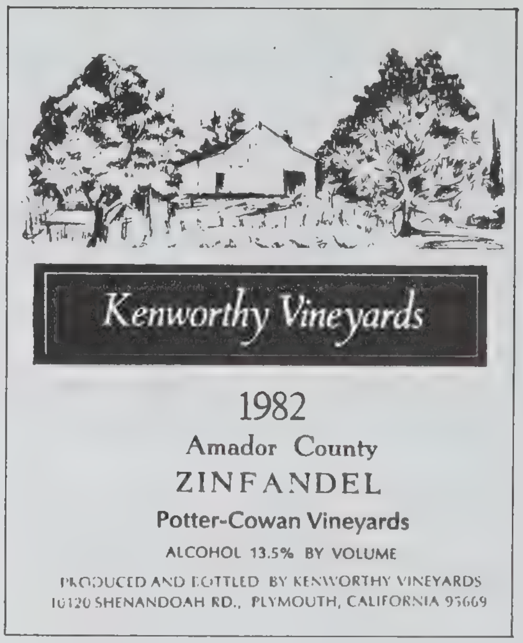
During fermentation, the cap is punched several times/day. "The punch is hard to work with, but it brings up the liquid from the bottom on the second or third pull." Kenworthy prefers punching the cap because it macerates the skins, loosens the pips so they settle, and brings out flavor components and some tannin. When Brix is between 8° and 9°, Kenworthy punches up to four times/day, as that is when the core temperature is hottest–right under the cap.

Except for his first two vintages (1979 and 1980), which were pressed dry, Kenworthy presses the must between 4° and 6° Brix (usually about the sixth day).

Between 1979 and 1986, Kenworthy Zinfandel was put into American oak (Blue Grass) barrels where the must fermented to dryness. It remained in barrels for about two years, and was racked as necessary. Kenworthy has never fined his Zinfandel, but has always filtered it–once after the second racking during initial tank- or barrel-ageing, and a final polish filtration prior to bottling. Kenworthy also encourages malolactic fermentation by inoculation, and has experimented with different bacteria.

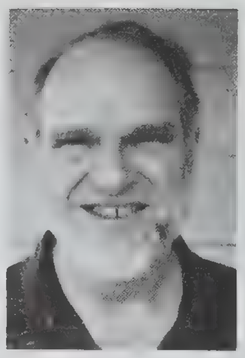
Beginning in 1985, Kenworthy began increasing the proportion of tank-to-barrel storage capacity by increasing the number of both steel and polyethylene storage tanks. "Steel and polyethylene tanks are much easier to keep clean," said Kenworthy, "which will both cut down on labor and make quality control easier." When fully implemented, he hopes to avoid entirely having empty barrels.

In general, the wine will spend less time in neutral wood and more in tanks. Wood, including some French oak, will be used during the second year of ageing almost exclusively for flavor. He expects these practices to produce a softer, fruitier, less oaky Zinfandel.



Kenworthy Vineyards

1982
Amador County
ZINFANDEL
Potter-Cowan Vineyards
ALCOHOL 13.5% BY VOLUME
PRODUCED AND BOTTLED BY KENWORTHY VINEYARDS
10120 SHENANDOAH RD., PLYMOUTH, CALIFORNIA 95669



John Kenworthy

Kenworthy Vineyards Zinfandel typically has 13–14% alcohol, 0.60 g/100mL TA, and 3.4 pH. Kenworthy Vineyards' total Zinfandel production is 1,000 cases/year.

Tasting Notes:

Kenworthy 1980

Color/Aroma: Light red; minty, eucalyptus, spicy, raspberry.
Flavors: Clean, austere, spicy, peppery, oaky.
Balance/Finish: Tart, tannic, oaky, needs more time.

Kenworthy 1982

Color/Aroma: Medium-dark ruby; blackberry, oak.
Flavors: Spice, black pepper, pruny.
Balance/Finish: Tart, oaky, short finish, needs age.

Santino Wines

Scott Harvey, winemaker for Santino Wines, believes that Amador Zinfandel presents a distinct regional challenge that requires special winemaking practices. He describes this as a tannin problem rather than a high-sugar/high-alcohol problem. However, since tannin extraction is increased by high alcohol, these two characteristics of Amador Zinfandel go hand in hand. His winemaking practices are designed to produce a fruity, full-bodied wine with tannins in balance.

Harvey, who learned winemaking in Germany, has made wine in Shenandoah Valley since 1974, when he began as assistant winemaker at Montevina Winery (the second winery to come into Shenandoah Valley). In the German language, there is no such word as 'winemaker'. Rather, the Germans use the term 'cellar master'. The wine makes itself, they feel. The cellar master simply controls the cellar conditions, or, in academic terms, controls toxicity.

Harvey believes that the mistake winemakers most frequently commit when working with Amador Zinfandel is to try to develop a recipe for it. "There is *no* recipe," he emphasizes. "Recipes consider only the chemistry; they don't consider the organisms or the flavor. You cannot make a first-class Zinfandel by considering just sugar, acid, and pH."

Grapegrowing

The harvest date is selected primarily by taste, not by the numbers. "Sometimes," he says, "I pick the grapes without ever checking the sugar. How they taste at harvest is far more important than what their sugar level is. If they don't have the flavor when you pick them, they'll never produce a flavorful wine." Harvey determines when to pick in accordance with the taste of the average ripe berry, but considers the percentage of shrivelled and green berries.

"Shrivelling is important to the character of Amador Zinfandel," he adds. "Some pruniness is part of the regional flavor, because you have to wait until your average berries have the flavor in order to get a full-flavored wine. This means there will be from 10–20% shrivelling at harvest. The ripe berries give the blackberry/spice character; the green berries, the citrus flavor; and the shrivelled berries, the pruniness." For additional pepper and spice, second crop is picked. How much second crop is used is determined by the vintage.

Grapes for Santino Wines, which come from several Shenandoah Valley growers, as well as from the Eschen Vineyards, Fiddletown, are picked early in the day, as fewer cells are broken when the grapes are cool. Unbroken fruit releases less bitterness than broken-up fruit. There is also less likelihood of extracting bitterness from stems of fruit picked early in the day.

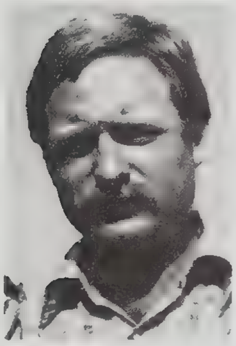
Winemaking

To crush the fruit, a pre-Prohibition crusher and a ball-valve must pump are used. "I like to push as many whole berries through the crusher/stemmer as we can," said Harvey, "as less tannin is extracted from whole berries than from mushed-up berries. The ideal berry is one that, when cut in half, is firm on both sides. You have to choose your crusher carefully when working with Amador Zinfandel, because of the high tannins."

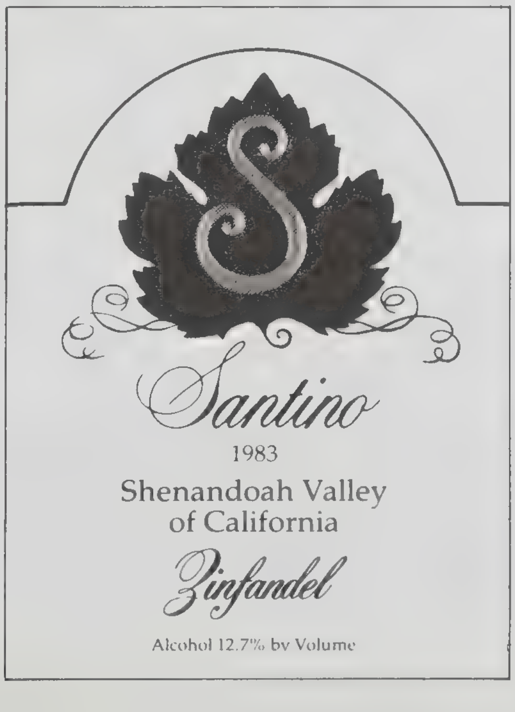
The crushed fruit is put into stainless-steel, closed-top fermenters, and topped with 8–16% whole clusters. The percentage of whole clusters is determined by the percentage of shrivelled berries: fewer shrivelled, fewer whole clusters; more shrivelled, more whole clusters. There are two reasons for adding whole clusters to the top of the fermenter: first, when pumping over, the cap is not macerated. This reduces tannin extraction. Second, whole berries ferment as whole berries (carbonic maceration). Zero tannin is extracted, but lots of fruitiness is added.

The must is inoculated with an isolated strain of vineyard yeast. Before harvest, a ton of fruit is picked and fermented to 10% alcohol or higher. All undesirable yeast is killed off by the time the must reaches 6% alcohol, which accounts for 98% of vineyard yeast. The remaining 2% survives, and is the strain used.

The must is fermented by bringing the core temperature up to 90–95°F as quickly as possible. Once the must reaches 90–95°F, the temperature is brought down to 85°F or lower until the wine achieves its maximum flavor potential without excessive tannins. This method of fermentation, believes Harvey, minimizes tannin extraction and maximizes fruit and other flavor extractions.



Scott Harvey



Santino

1983

Shenandoah Valley
of California

Zinfandel

Alcohol 12.7% by Volume

"High temperature plus high alcohol equals tannins," he says. "If you get your temperature up before the solvent alcohol is high, you can get your wine character without excessive tannins. Then, at the lower temperature, you get fruit while the remaining sugar ferments."

Closed-top fermenters are used to retain fruit. As alcohol evaporates from an open-top fermenter, it carries off some fruitiness, believes Harvey. Amador Zinfandel always has enough tannin, so the must is pressed when the fermenting wine tastes right. "You need a trained palate to taste the fermenting must," Harvey points out, "because the must will always taste sweet. You have to be able to distinguish flavor and tannin extraction over and above sweetness." The must is pressed when it is between 5° and 12° Brix.

After pressing, the wine is put in four-year-old French oak barrels. Primary fermentation completes in these barrels, as well as a spontaneous malolactic fermentation. The wine is left on the gross lees as long as possible–usually until March, as the lees bind with some of the tannin. When the lees settle out, they carry some of the tannin with them. The lees also contribute to flavor; they help to create a richer, softer wine; and the nutrients from the lees help the malolactic fermentation along.

The wine is racked for the first time in March, or just before H_2S forms. Fermentation continues through spring, during which time the wine is allowed to warm to 70°F in order to finish fermentation. Malolactic fermentation completes in the fall. The second racking is just before harvest.

Santino Zinfandel remains in French oak cooperage the second winter. After barrel-ageing, the wine is given a rough polish filtration. It is not fined, as Harvey believes that as long as his winemaking techniques have kept the tannins under control, no fining is necessary. While fining does take out some tannins, it also removes some important other flavonoids. Zinfandel fruits are delicate, believes Harvey, and can be easily fined out.

Santino Zinfandel is bottle-aged for one year or longer before release. That year in the bottle softens the tannins, rendering the wine very palatable upon release, according to Harvey.

Santino Wines' 1986 production of Zinfandel was 4,000 cases.

Tasting Notes:

Santino 1980

Color/Aroma: Ruby, hazy; cedar, berry, medicinal, olive, herbs.

Flavors: Oak, blackberry, jammy, raisiny.

Balance/Finish: Big style, tannic, long finish, slightly low acidity.

Santino 1981

Color/Aroma: Light red; brambleberry, minty.

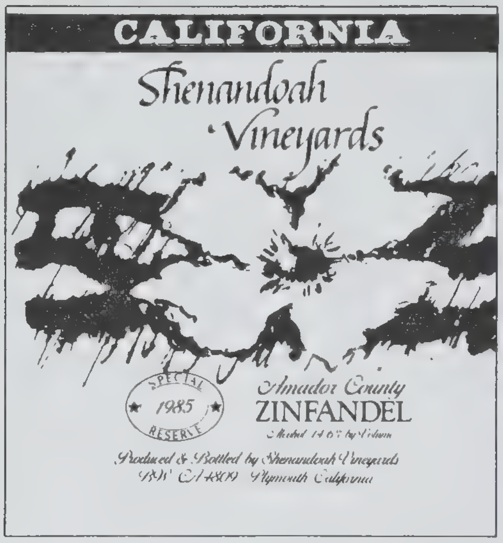
Flavors: Spicy, peppery, minty/estery, tannic, oaky.

Balance/Finish: Smooth finish, ready to drink, tart.

Shenandoah Vineyards

Leon Sobon, owner/winemaker of Shenandoah Vineyards, began making wine when he was working as a senior scientist with Lockheed in Palo Alto, CA, in the early 1970s. His winemaking group bought Zinfandel from Amador County. Sobon's early Zinfandel style was influenced primarily by Ridge Vineyards and Sutter Home. Sobon was especially impressed by Ridge's 1974 Zinfandel–its first from Amador grapes (Eschen Vineyards, Fiddletown).

In 1977, with the support of his wife and six children, Sobon gave up ceramic engineering for winemaking and chose Shenandoah Valley. Land there, if no longer cheap, was inexpensive compared to other wine regions–and it was Zinfandel country.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Leon Sobon

Sobon made his first commercial Zinfandel in 1977. That vintage, and the two that followed, were tannic, full-bodied wines made from fully-ripe to overripe fruit—in the style of Ridge and Sutter Home Amador Zinfandels.

"Between 1974 and 1978, the big, rich, tannic wines of Ridge and Sutter Home had acquired cult status. Many winemakers had come to believe that overripe was better than ripe. I was one of them," admits Sobon. "However, it was a belief that spoiled Zinfandel's reputation somewhat."

The 1978 and 1979 Zinfandels were his two worst vintages. "To begin with, the growing seasons weren't good. There was early rain, then heat. There was a lot of raisining, and tannins were heavily extracted." To make matters worse, Sobon was drawing off juice for white Zinfandel, increasing the already-high tannin concentration. Those two vintages were out of control, unbalanced. "Yet they sold out," he says. "There was still some good press for big, tannic, rich Amador Zinfandels."

Grapegrowing

No longer believing that overripe is better than ripe, Sobon has sought, since 1980, to produce balanced fruity Amador Zinfandels with 13–14% alcohol and tannin extraction determined by the vintage and vineyard. The fruit comes from old Amador vineyards: the Eschen Vineyard, Fiddletown, about 24 tons; all of the 15-acre Dal Porto Vineyard, lower Shenandoah Valley; Fox Creek Vineyard, Shenandoah Valley (the old Montevina Vineyard), 30 tons; and all of Hoffman Vineyard, Shenandoah Valley (formerly contracted to Mayacamas Winery, Napa). In addition, Shenandoah purchases fruit from Ferrero Vineyard, Shenandoah Valley, whenever Ferrero has more fruit than he has contracts for.

All these vineyards are dry-farmed and are at least 60 years old. Fruit from Fiddletown, grown at an elevation of 1,800 feet, has greater concentrations of tannin than does fruit from Shenandoah Valley vineyards, which are grown at elevations between 1,200 and 1,400 feet.

Sobon tries to pick when the vineyard contains about 10% shrivelled berries. Twenty-two and a half to 23° Brix, with an average TA of 0.65–0.85 g/100mL and pH of 3.1–3.2, is the goal in the tank prior to fermentation. "Small crops from old dry-farmed hillside vineyards ripen fast up here," he says. "You really have to be in the vineyards daily, sometimes twice daily, in order not to lose control of the sugar. The lush black cherry/blackberry/cassis fruitiness is what Amador Zinfandel is about. It can be overpowered by tannin and alcohol."

Winemaking

Fruit is crushed, then fermented at 84–88°F to enhance flavor and balance. Pump-over is twice daily for 20 minutes. The must is usually pressed between 1° and 4° Brix, sometimes at 6°, and transferred to 1,000-gallon American and French oak tanks, where it completes fermentation. The press wine is added back.

This fermentation method was developed in 1984, as a further attempt to control tannin extraction. The temperature is cooler, and the time on the skins is shorter than in the previous fermentation method. "I've discovered that high temperatures and longer time on the skins just aren't necessary to produce flavorful Zinfandel from Amador fruit," says Sobon. "Less tannic Amador Zinfandel is drinkable soon after release—and it gains complexity in the bottle."

During a year in oak tanks, malolactic fermentation is encouraged by inoculation during primary fermentation with a mixed-culture inoculant. The wine is racked three times during this year.

The wine is racked into American and French oak barrels. The American-oak barrel percentage is being decreased with the goal of using 100% French oak by 1990. The wine is racked twice during one year of barrel-ageing.

After barrel-ageing, the wine is fined with gelatin and given a rough filtration. The wine is sterile-filtered at bottling. It is released 8–10 months after bottling, and Sobon expects most vintages to improve with 4–6 years' bottle age.

"Well-balanced Amador Zinfandel will gain complexity in the bottle for several years," he believes. "It seems to progress in bursts, then hold, then progress. It perhaps loses a little of its berry fruit, but it will make up for it in complexity.

"Amador Zinfandel has an especially good balance of fruit (black cherry, blackberry, cassis) and spice (cinnamon). Acid levels vary among old vineyards. Cool years produce high acid levels; 1982 was especially good, as were 1984 and 1985—both of which will be among our best vintages."

Since 1984, only a reserve Zinfandel has been produced. The wine is a blend of the best lots from the four vineyards. Prior to 1984, both a reserve Zinfandel and either a vineyard-designated Zinfandel or a 'regular', non-vineyard-designated Zinfandel were produced.

The wine from the lots not used in the reserve vintage is sold under private labels. "It just happened," Sobon explains, "that restaurants began wanting house Zinfandels with their own labels. It was good for me, because it removed a marketing problem. It's always easier to market one Zinfandel than two." Sobon noted that should he ever have more Zinfandel than he can sell under private labels, he will again release a regular, or a vineyard-designated, Zinfandel.

Shenandoah Vineyard produces 4,000 cases annually of reserve Zinfandel.

Tasting Notes:

Shenandoah Special Reserve 1982

Color/Aroma: Dark red; pepper, raspberry, herbaceous, spice.

Flavors: Cherry, blackberry, raspberry, peppery.

Balance/Finish: Tannic, long, rich, finish, will age.

Shenandoah 1984

Color/Aroma: Red; varietal berry nose, burnt match, pruny, spicy.

Flavors: Rich, fruity, plummy, oaky.

Balance/Finish: Good balance, rich finish, some tannin.

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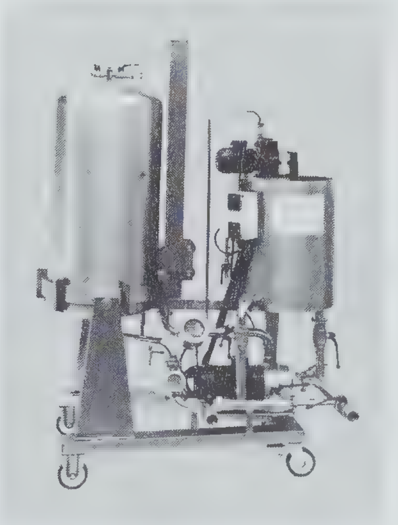

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K.C. Fugelsang
Department of Enology, Food Science, and Nutrition
California State University, Fresno

Until recently, most winemaking has relied on fermentations originating from yeast present on the grape at harvest. In certain classic wine-producing areas, winemakers still maintain that fermentations result entirely from yeasts native to their vineyards, and attribute much of the character of their wine to this fact.

In some cases, native or 'wild' flora from the vineyards are selected by conducting laboratory-scale fermentations prior to the onset of harvest. From the most promising of these fermentations, yeasts are isolated and subsequently expanded to become the starter for that crush. Although time-consuming, the technique works well primarily because of the long association of grapegrowing and winemaking in these areas.

Certainly, a hundred or more years of plowing pomace back into the vineyard has probably established the wine yeast as a dominant yeast flora. Coupled with this, *Saccharomyces* is generally very competitive, quickly outgrowing other genera whose activity may be slowed by the generally unfavorable conditions presented by grape must and wine.

By comparison, the developing wine areas in the U.S. do not have as long an association of vineyard and winery. Thus, reliance on wild yeast in newer viticultural areas of the U.S. may result in the growth of spoilage yeasts rather than sought-after wine strains. As a result, the American wine industry almost totally depends upon the use of yeast starters to carry out fermentation.

Having established the importance of adding a yeast starter, at least in the U.S., it seems incongruous that winemakers too often devote little attention and time to this critical step in wine production. Perhaps more attention would be given to the care and handling of wine yeast if we would consider the conditions under which we are not only asking the yeast to grow, but to produce award-winning wines.

Initially, the yeast finds itself plunged into a high-acid environment of over 20% sugar with variable levels of SO_2. On top of this, it may often be expected to grow at low temperature in an environment where, on occasion, available nutrient levels may be limiting.

Unfortunately, life doesn't get any easier. Once fermentation begins and alcohol is formed, the environment becomes increasingly toxic to yeast. This is compounded and made worse in that nutrient available at the onset of growth is continually being utilized by the growing yeast, and may be exhausted before the available sugar is consumed.

Thus, by the end of fermentation, the yeast may be suffering from malnutrition and feel the effects of alcohol toxicity. Further, since growth has probably proceeded under anaerobic or at least strongly-reducing conditions, the condition of the cell membrane may be adversely affected, resulting in interrupted transport of essentials into and metabolites out of the cell.

Given the conditions presented in the above scenario, and the fact that the winemaker is probably unwilling to yield to the needs of a yeast, it would seem that the life of a wine yeast is not an easy one. Thus, every effort should be made to ensure that the yeast begin its life in this inhospitable medium in the best possible condition, and prepared for the challenges ahead.

To gain a feel for the importance of yeast starters in successful winemaking, it may be useful to track what happens to yeasts during the course of their growth. Recalling introductory microbiology, we can identify at least five phases that occur during microbial growth.

Upon inoculation of inactive or resting cells into an appropriate medium, one usually sees a delay in visible reproductive activity lasting from less than an hour to several days, depending upon the physiological condition of the organism and the environment in which it finds itself. This period, technically referred to as the *lag phase* of growth, may be thought of as a period of cellular organization, a time in which the biosynthetic machinery of the cell gears up for growth. During the latter stage of this period, budding begins and yeast enter a period of rapid growth known as the *log phase*.

When properly prepared, the yeast starter ensures that upon inoculation, the majority of yeast in the must are at, or entering, their most rapid, or log, phase of growth. This is accomplished by manipulation of the culture from lag to rapid growth phase, and may include addition of exogenous nutrient in the form of nitrogen supplements as well as mechanical agitation of the starter to incorporate oxygen needed for growth.

With regard to growth characteristics, yeasts differ somewhat from bacteria in that budding in yeast does not occur with the regularity of bacterial fission. Thus, the logarithmic pattern of growth experienced with bacteria is generally not as apparent when we follow profiles of yeast growth.

At some point, the presence of increasing amounts of alcohol and disappearance of nutrient begin to stress the yeast, and it enters a period in which the number of healthy cells stabilizes at some maximum number, usually around 100 million cells/mL. Eventually, viable cell numbers begin to drop off and the culture enters the death or decline phase.

Ideally, this should coincide with the completion of fermentation. However, complicating factors may enter into consideration. These include the potential for sluggish or stuck fermentations. While a good deal of research has been directed toward dealing with abnormal fermentations, the problem may, in large part, be mitigated by the use of properly-prepared yeast starters.

Commercially, wine yeasts are available in dehydrated (active-dry) form, on agar slants, and in already-expanded liquid culture. Strain selection often depends upon the personal preference of the winemaker as well as his or her experience with that strain's fermentation characteristics in the production of a particular style of wine.

Additional considerations include the capability to deal with transferring and expanding cultures. In these cases, the winemaker must deal with transferring and growing yeast under sterile conditions prior to addition, or pay a supplier to handle this phase for them.

Propagation from Slants

Successful utilization of cultures requires the technical support and expertise to expand the culture, without contamination, to a final starter volume that represents from 1–3% (v/v) of the total volume of must to which it will be added. Subsequently, the starter tank must be maintained, without contamination, until the must is ready for the inoculation.

Logistically, several 'loopfuls' of the culture are initially transferred from the slant to approximately 100mL sterile-filtered or heat-sterilized free-run juice. In cases where heat-processed juice is used for starter propagation, it is suggested that the juice be boiled for at least 10 minutes per gallon. In the case of sterile-filtered juice, no sulfur dioxide should be present at inoculation. Once this culture is actively growing, the volume is expanded twofold using sterile juice.

From this point, the culture is expanded in a series of five- to tenfold increases to yield the final yeast inoculum. This volume is used to prepare the larger yeast starters for direct addition to must.

After the addition of yeast inoculum to the starter tank volume, 24–72 hours may be required before the starter reaches sufficient titer to add to must. Growth should be followed microscopically, noting viability as well as percentage of budding cells.

The definition of a 'budding cell' varies. Traditionally, a budding yeast is described as one in which there is a physical attachment between mother and daughter cells. That is, separation has not occurred. In other instances, laboratories choose to include those cells that are less than ½ the size of the average cell in the field as part of the budding cell number. In actively-growing starters, budding cells, upon addition to the must, should comprise 60–80% of the total cell number.

Although it's convenient, the practice of holding back 5–10% of the starter to serve as inoculum for fresh sterile juice may cause problems for the winemaker. Over the course of the season, this practice may introduce contamination from other yeast and bacteria, thereby making the starter a source for initial introduction of spoilage organisms.

Further, prolonged use of this technique may result in depletion of critical cell components. One specific example is reduction in the levels of steroids when the cell is continually grown under strongly-reducing conditions. Such stressed cells would not be expected to yield vigorous starters and, hence, fermentations originating from these starters may experience difficulties in starting fermentation as well as completion to dryness in a timely manner.

Starter tanks must be maintained and monitored constantly to ensure that ample nutrient in the form of nitrogen and carbohydrates are available and that the levels of alcohol do not become inhibitory. Starter tanks should be transferred before sugar levels are fully depleted. Nutrient exhaustion may force growing yeast into a secondary lag phase and significantly reduce cell viability and delay activity upon transfer.

Maintaining stock cultures throughout the year may cause additional problems. Cultures held on agar slants at refrigeration temperatures tend to dehydrate and, unless transferred regularly, lose viability. Several techniques can extend the longevity and viability of a culture. These include overlaying the culture with mineral oil as well as more sophisticated techniques (Pilone, 1979).

However, even with regular transfers, cultures maintained on agar media for extended periods of time tend to lose, or, in some cases, gain, physiological traits that previously have distinguished them from other strains. Occasionally, these changes may affect the properties of the yeast to a point where future fermentations may be affected and the character of the wine altered.

Problems of strain maintenance and physiological integrity may be overcome by periodically using the yeast to carry out small-scale fermentations and then re-isolating. Needless to say, this requires considerable effort and expense.

Wine Active-Dry Yeast

One way to avoid problems associated with culture maintenance and expansion is to use dehydrated yeast. Historically, research on utilization of commercially-produced dried yeast dates back to the early 1950s. In 1965, Red Star Yeast (Universal

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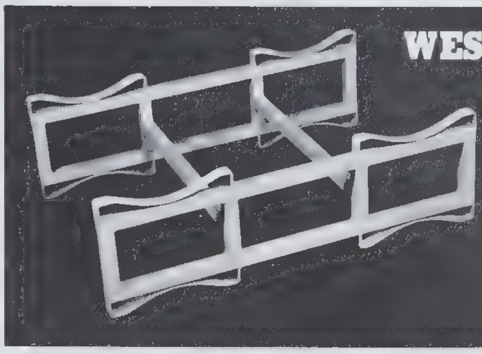

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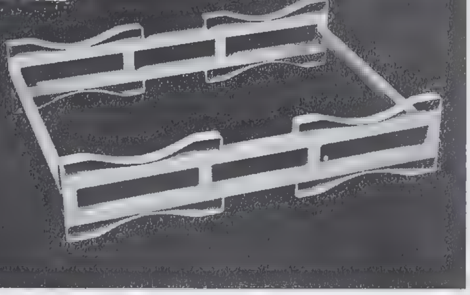

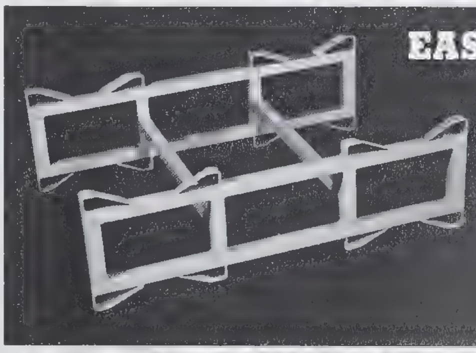

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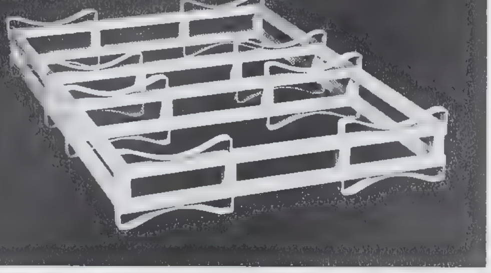

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Foods Corporation) released its first wine active-dry yeast (WADY). Today several companies are marketing dehydrated yeast strains for the American wine industry.

Although many of the wine-producing areas of the world cling to their history of relying on wild or natural yeast flora for fermentation, internationally the use of wine active-dry yeast is becoming more prevalent (Lafon-Lafourcade and Ribereau-Gayon, 1976; Reed and Chen, 1978; Diettrich, 1979).

With improved technology of yeast production, several strains have become available and are currently marketed in this form. The most popular yeasts among winemakers continue to be Montrachet (*Saccharomyces cerevisiae*) and Champagne #595 (*Saccharomyces bayanus*). Other available strains include Prise de Mousse, Epernay II, Steinberg, and, for sherry production, *Saccharomyces beticus*.

Although preference for a particular strain as well as inoculum level tends to vary with the winemaker, the methodology of starter preparation represents the most important step in the future life of that yeast. Unfortunately, this critical step is too often given only casual regard when winemakers use dehydrated yeast.

On one hand, there are winemakers who simply spread the yeast pellets over the must's surface or mix them into the must. Often, however, this results in formation of clumps that are difficult to disperse. In that those cells trapped within the aggregate matrix are incompletely rehydrated, viable cell titer is reduced from recommended levels. By comparison, a more technically correct protocol calls for prior rehydration in either must or water. In that both techniques will work, economics should dictate that one would optimize rehydration and addition protocol to maximize the numbers of viable cells/mL.

Kraus, et.al., (1981) studied the effect of rehydration at cold and warm temperatures and reported the optimal range to be between 37.8° and 43.0°C. They found that at this temperature, 15 minutes was sufficient for rehydration and maximum activity.

Physically, rehydration in warm water or must tends to disperse the yeast to a much greater extent than when added to cold must where the pellets tend to remain intact and, in fact, clump. This results in reduced nutrient and oxygen availability and incorporation into the cells. The final outcome of this is reduction in the numbers of active yeast that would otherwise be seen if the same weight of yeast were dispersed in warm water.

Physiologically, the effects of rehydration at cold versus warm temperatures seems to center on the integrity of the cell membrane. Hydration at low temperature slows the reactivation of the membrane to a point where essential soluble cytoplasmic components escape before membrane function can be reestablished.

Thus viability is greatly reduced at low rehydration temperature. Monk (1986) points out that hydration at 15°C may result in up to 60% cell death. By comparison, activation at warm (40°C) temperatures quickly establishes the membrane barrier and function before the leaching effect can occur. When yeasts are rehydrated in water, they should not be allowed to remain ther for more than 30 minutes before transfer to must. Longer hydration periods tend to reduce viability.

Inoculum Levels

Although the cell titer varies, typical addition levels are on the order of 2–5 million cells/mL. In the case of high-sugar musts and other instances where the fermentation may encounter difficulty, higher addition levels should be considered. In these special cases, yeast starters may further benefit from nitrogen and oxygen supplementation. These considerations are more completely discussed later.

Yeast added at 1 lb/1,000 gal (10 g/hL) yields approximately 2 million cells/mL of must. During the course of growth, yeast titer generally reaches a level of 100 million cells/mL, corresponding to about a fifty-fold increase.

As was the case with yeast propagated from slants or liquid culture, yeast manufacturers caution against allowing yeast starter to completely exhaust available sugar prior to transfer. It

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is strongly suggested that the winemaker follow the progress of growth microscopically, monitoring not only total cell number, but, very importantly, viability and the percentage of budding. Unlike yeast starters expanded from liquid cultures in which the budding cell count is high, the percent of budding cells in the case of freshly-rehydrated yeast is usually only around 2–3%.

It is becoming increasingly apparent that yeast need a certain amount of oxygen for growth. Prolonged growth under semi-anaerobic conditions reduces the steroid content of the cell membrane, thereby making the yeast more sensitive to the effects of alcohol.

In the final stages of dried yeast manufacture, producers generally manipulate growth conditions such that, upon rehydration, yeasts have sufficient steroids for 4–5 generations. Beyond this, budding diminishes important membrane components, resulting in stress and the potential for stuck fermentations. Thus, yeast suppliers recommend oxygen incorporation into starter tanks during the course of expanding volumes. Cone (1987) points out that actively-growing yeast starters take up oxygen rapidly and before must oxidation occurs.

Since simple mechanical agitation or pumping over may not increase the oxygen concentration to levels needed, it is suggested that compressed air be bubbled directly into the starter tank. Use of pure oxygen should be avoided because of its toxicity.

Actively-growing yeast should not be transferred to chilled (50°F) must. Cold shock may reduce the viable cell count by up to 60% and, in general, result in slow growth and increase the potential for problem fermentations. Furthermore, sudden drops in temperature may result in H_2S production. Where fermentation at lower temperatures is needed, starters should be acclimated to growth at the lower temperature prior to inoculation.

When purchasing active-dry yeast, winemakers should plan to order only enough to fulfill their needs for that season. Dehydrated yeasts, even when stored under ideal conditions, lose viability over the course of a year. For example, at 4°C, activity is reduced by 5% per year and at 20°C, activity drops by 20% per year.

Conclusion

Final selection of a particular yeast strain is usually based upon personal preference and positive experience with the strain. While strain performance, no doubt, varies with different environmental conditions, the position that significant sensory differences are to be expected between strains appears to be overstated.

As suggested in the body of this review, utilization of active-dry yeast or other cultures may depend, in large part, on the winemaking or laboratory staff's ability to deal with handling the latter. The cost of active-dry yeast ranges between $.007–$.02/gallon. By comparison, cost of liquid cultures, while initially significantly less, is offset by the time involved in propagation as well as maintaining the active starter, without contamination, once it is expanded.

However, regardless of the yeast strain used or the form in which it is acquired, the focal issue should be propagation of a healthy, vigorous starter that will carry out the fermentation in a timely manner with a minimum of complications.

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Protein Fining Agents, Part II

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Gelatin and Kieselsol

PW asked winemakers to respond to the following question: Have you used protein or protein-like fining agents to affect any of the following characteristics, and, if so, which agent was used? Not surprisingly, gelatin was determined to be one of the most frequently employed protein agents utilized. The responses are found in Table I.

A comparison of the attributes and deficiencies of various fining agents can be found in Part I of this series (*PW* May/June 1987).

Protein fining agents are commonly utilized for modifying the juice and wine phenol composition. Gelatin's action on this class of compounds can have a dramatic effect on red color, astringency, bitterness, body, finish, browning, odor, ageing and oxidation potential. As indicated in Table I, astringency modification is an important reason for using gelatin.

Astringency & Bitterness

Astringency is a contracting (puckering), drying-mouth feeling involving precipitation of saliva proteins on the mucous membrane surface. Bitterness is a true taste which is confused with the tactile sensation of astringency even by experienced tasters. Many nonflavonoids as well as small molecular-weight phenols such as catechins are bitter while larger, polymerized phenolic compounds (tannins) contribute to wine astringency.

Astringency is proportional to the protein binding ability, with flavonoid tetramers being the most astringent (3). Increased levels of astringency mask bitterness (4). Therefore, removing a portion of the astringent polymeric phenols with a protein fining agent such as gelatin may render a perceivable bitter character to the wine following protein fining.

Flavor-unmasking in wine is an important feature of gelatin fining. As young wines age, phenols polymerize or bind together. Astringency increases with an increased degree of polymerization. As wines age and lose tannin phenols due to oxidation and precipitation, or are fined with a protein fining agent, they become less astringent and may show an unmasking of bitterness.

Undoubtedly, some bitterness in red wines adds complexity. However, unmasking of bitterness as the result of fining may raise the perception of bitterness to undesirable levels.

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TABLE I—Fining Agent Questionnaire Response

	Gelatin	Casein	Isinglass	Egg Whites	PVPP	Yeast-Fining	Total
Clarity	46	5	21	33	8	0	113
Texture	14	11	7	29	4	2	67
Body	5	1	1	17	2	2	28
Astringency	72	20	7	80	17	0	196
Bitterness	41	20	12	32	44	1	150
Nose Character	5	9	6	10	8	9	47
Fruit	2	2	4	5	5	0	18
Finish	23	16	13	31	15	0	98
Ageing Potential	8	0	4	12	9	0	33
Improved Filterability	35	0	8	13	3	0	51
Lees Compactness	25	1	5	2	1	0	34
Palatability	27	16	12	33	17	7	112
Color Removal	8	21	1	0	44	5	75
Color Stability	3	13	1	2	56	1	76

Effects of Gelatin

The selectivity of gelatin for different phenols depends upon optimum type, placement, and geometry of bonding sites to give a stronger total bond with one phenol over another. The phenol/gelatin combination which results in the strongest total hydrogen bonding usually occurs.

Phenols with the most available hydroxyls (or other hydrogen-binding group) per molecule are often absorbed preferentially. As such, large molecules like tannins are preferentially removed by gelatin fining, because large molecules have more total phenol groups and therefore more hydrogen-bonding potential.

Table II shows the results of fining on a one-year-old red wine with 30% liquid gelatin.

TABLE II—The Effect of Gelatin on Wine Phenols

	Control Wine	Wine Treated with 10 g/HL of 30% liquid gelatin
Total polyphenols mg/L	1680	1500
Anthocyanins mg/L	55	53
Leucoanthocyanins mg/L (Flavon 4 diols)	137	117
Polyphenols w/molecular weight between 500–3,000 (tannins) mg/L	300	150

Source: Soluzione Stabile De Gelatina per il pronto impiego-Chimici Spa.

The effect of gelatin on the various components listed in Table II is, in part, a function of the degree of phenol polymerization, i.e., the age of the product. Protein fining agents can have a stripping action which is much more severe on aged wines than juice or young wines. The phenol structure of an aged wine can be modified with gelatin to significantly affect the astringency, bitterness, and red wine color. Additionally, the loss in astringency can affect the extract, the body, and the finish.

We asked *PW* survey participants the following additional question: Which products are fined with gelatin? The results are listed in Table III.

Gelatin fining of juice, particularly press juice, is a means of reducing the harshness, brown color, and nonsoluble solids prior to fermentation. Some have found this a very desirable means of improving palatability of heavy press juice.

Quantities of gelatin needed to achieve a desired level of clarification may reduce wine astringency to undesirably low levels. Most white wines have such a low precipitable phenol content that an addition of tannin or kieselsol is needed for reaction with gelatin. If this is not done, gelatin may remain suspended in the juice or wine.

If tannin is used in white wine in conjunction with gelatin, addition of the tannin is often made 24 hours prior to gelatin fining. Of those reporting tannin/gelatin co-fining, 68% add the tannin 24 hours prior to gelatin fining, while 10% add tannin in-line at the time of gelatin fining.

The tannin/gelatin ratio for optimal results is often 1/0.5 (by

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weight) but will vary depending on the individual wine and the source of the tannin.

Kieselsol

Some producers prefer to fine juice or wine with kieselsols instead of tannin in conjunction with gelatin. Kieselsol is a generic term for aqueous suspensions of silicon dioxide and was developed during World War II as a tannin substitute.

The reaction mechanism between tannin and gelatin is hydrogen bonding between the phenolic hydroxyls of the tannin and the peptide bonds of the gelatin. In replacing tannin with standard kieselsol (negative-charged), essentially the same reaction occurs.

Several kieselsol products are available. Characteristics of these products depend on several factors, the most important being method of production. The production method controls the particle size, shape and nature of the surface (perhaps the most important parameter), particle size uniformity within the suspension, and the particle charge density.

The charge density is determined by the number of hydroxyl groups (OH) on the surface of the kieselsol particle available for binding. This is determined, in part, by the pH of the kieselsol suspension (1). The strength of the bonds formed between kieselsol particles and protein fining agents depends, in part, upon the number of active sites available and the charge density.

TABLE III

White Juice	12%
White Wine	34%
Red Juice	2%
Red Wine	49%
Juice for Sparkling Wine	1%
Sparkling Wine	6%
Juice for late harvest wine	3%
Late Harvest Wine	1%

There are a number of commercial kieselsols on the market with a variety of particle size, shape, size uniformity, surface nature, and charge density.

Effectiveness of kieselsol/gelatin combinations for clarification is dependent upon the nature of the juice or wine, the nature of the kieselsol used, and the bloom number of the gelatin employed.

For kieselsol finings in conjunction with gelatin, a low bloom number is usually required (between 70 and 130). Using a high-bloom gelatin in conjunction with kieselsols may leave unflocculated gelatin remaining in suspension.

Researchers (Wucherpfenning et al, 1973; Schatzlein and Sailer, 1940) indicate kieselsol/gelatin to be superior to tannin/gelatin for the following reasons:

1) There are less lees produced.
2) The rate of precipitation is faster.
3) The clarity is often superior.
4) The action of gelatin appears to be more gentle with kieselsol/gelatin than with tannin/gelatin.

The practical aspect of item #4 is that there is less flavor stripping. Unlike tannic acid, kieselsols are man-made and can therefore be of the highest purity.

Table IV presents work from my laboratory showing some relationships between kieselsol additions, protein fining agents, and bentonite on clarity, lees formation, and total phenols.

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TABLE IV–Wine Treatment with Kieselsol 30% (g/L)*

	Control	0.2 g/L kieselsol 0.03 g/L gelatin	0.4 g/L kieselsol 0.06 g/L gelatin	0.5 g/L bentonite 0.02 g/L gelatin	2.0 g/L bentonite 0.3 g/L K. casein
Volume of lees %	–	1.5	1.2	2.1	1.8
Clarity (0-10)	5.5	8	9	7.5	8
Total Phenolics mg/L 6 AE	1435	1030	980	1390	1304

*120 g/L = 1 lb/1000 gal

Gelatin is sold in sheets, pearls, powders, and liquids. Dry gelatin is prepared either by expanding in cold water for several hours and then dissolving the resulting gelatin by heating the solution to 30°C, or by dissolving the gelatin in 45°C water while constantly stirring.

Prolonged or excessive heating of the gelatin slurry results in the hydrolysis (breakdown) of the gelatin molecule. This can have a significant effect on the fining properties of the gelatin. Therefore, laboratory trials must be performed using the same material that will be used in the cellar.

Liquid gelatins are produced by hydrolysis to reduce molecular weight (some as low as 2,000) by the addition of salts, heat, or both. Such procedures prevent gelatinization at high concentrations to allow these products to remain liquid. Liquid gelatins usually range from 30 - 46% gelatin and are stabilized with benzoates, sulfur dioxide, or both.

Addition levels of gelatin range upward from about 1/16 lb/1,000 gal. The level in red wines is often in the range of 6–10 g/hL (0.4 to 0.8 lbs/1,000 gal. If employed in white wines, the range is often 6 - 10 g/hL following a tannin addition of approximately 10–15 g/hL of kieselsol depending upon the nature of the wine and the desired response.

Much larger doses are often employed in juice fining, particularly press juice fining. Fining heavy press juice with 4 lbs/1,000 gal gelatin, 10 lbs of kieselsol, and 1–3 lbs bentonite is often an effective means of removing both harshness (astringent phenols) and color.

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Montrachet, UCD 522
Steinberg, UCD 529
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Prise de Mousse, UCD 594

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Embossed Bottle Identifies Amador Wines

A group of Sierra Foothills winemakers, all of whom produce wine from Amador County grapes, has introduced a specially-embossed flat-bottom claret bottle to identify Amador County wines. The purpose is to promote regional identification of Amador County wines among consumers.

The Amador bottle, supplied by Alco Packaging, has a special embossed design on the shoulder depicting the Amador Vintners Association logo and the word 'Amador'. Wineries which use the bottle pay a small premium to help repay the cost of the proprietary mold.

Among wineries using the Amador bottle are Amador Foothill Winery (1986 Fumé Blanc and 1986 white Zinfandel), Montevina (1985 Fumé Blanc, 1985 white Zinfandel, and 1982 Zinfandel), Santino (1986 White-Harvest Zinfandel), Shenandoah (1986 white Zinfandel, 1986 Zinfandel Special Reserve), and Winterbrook (1985 Zinfandel, 1986 white Zinfandel, 1986 dry Chenin Blanc).

Amador Foothill Winery will distribute the bottle in 12 states, Montevina in 22, Santino in 21, Shenandoah in 15, and Winterbrook in 7. Key markets are California, Ohio, Colorado, New Mexico, Washington, Oregon, New York, and Michigan.

A wine must meet certain qualifications in order to be bottled in the Amador bottle. The wine must be 95% from Amador County, but can be from any grape variety. Wineries desiring to use the bottle must submit their wines to a review by a tasting panel to ensure sound quality. The panel, which meets the first and third Tuesday of every month and as needed, consists of a minimum of one representative from each of a minimum of four Amador Vintners Association-member wineries. Wineries outside of the Amador Vintners Association may submit wines for review.

Qualifying Procedure

The panel tastes blind. In order to maintain strict confidentiality and impartiality, a fifth or additional person is involved as tasting panel coordinator, although he or she does not serve as part of the tasting panel. The tasting panel coordinator must be an Amador Vintners Association member. This person is the only one who knows the identities of the wines tasted, and is responsible for uncorking each bottle, removing any cap, bagging each bottle, and assigning a number or letter to each wine. If a simple majority of the tasting panel finds the wine of sound quality, it qualifies for the Amador bottle.

Upon completion of the tasting, regardless of the results, the panel is not told whose wines they have tasted. Each member presents an anonymous written review which tells whether the wine passed or failed, with the reviewer's comments on the wine. In the case of a flawed wine, comments may be made regarding any possible 'clean-up' procedure. The tasting panel

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coordinator then notifies the wineries who submitted samples for review of the results.

If a submitted wine does not qualify, an additional sample of it will be sent (at the request of the winery whose wine was rejected) to a consulting wine laboratory for the panel's conclusion to be confirmed or denied. The results are mailed to the tasting panel coordinator. If the laboratory disagrees with the panel's conclusion, the wine qualifies for use of the Amador bottle.

If the laboratory agrees with the panel's conclusion, the wine does not qualify for the Amador bottle. However, the winery may re-submit the wine for further review as soon as it feels that the problem has been rectified.

The Amador Vintners Association is responsible for all fees resulting from the laboratory's review of wines that do not qualify. All results of the tasting panel and of the laboratory are strictly confidential and are not disclosed. The records of non-qualifying wines will go back to the submitting winery. Alco Packaging will sell the glass only to those wineries approved by the Amador Vintners Association.

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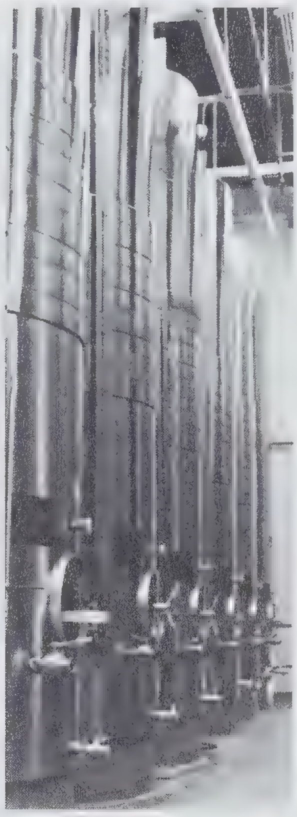

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A major problem associated with inducing malolactic fermentation is timing. If it is delayed excessively, some delay in processing can result, or it may even occur after bottling, and result in spoilage. Most winemakers would prefer that it take place immediately following alcoholic fermentation.

Unfortunately, even following inoculation with pure cultures of selected bacterial strains, MLF can be delayed. Fig. 1 illustrates a typical pattern of a traditional, delayed MLF where an added culture of bacteria, *Leuconostoc oenos* (ML-34), at 1% inoculum, required a long adaptation period in the wine. Bacterial growth and malolactic conversion were delayed until long after the alcoholic fermentation, which completed in nine days.

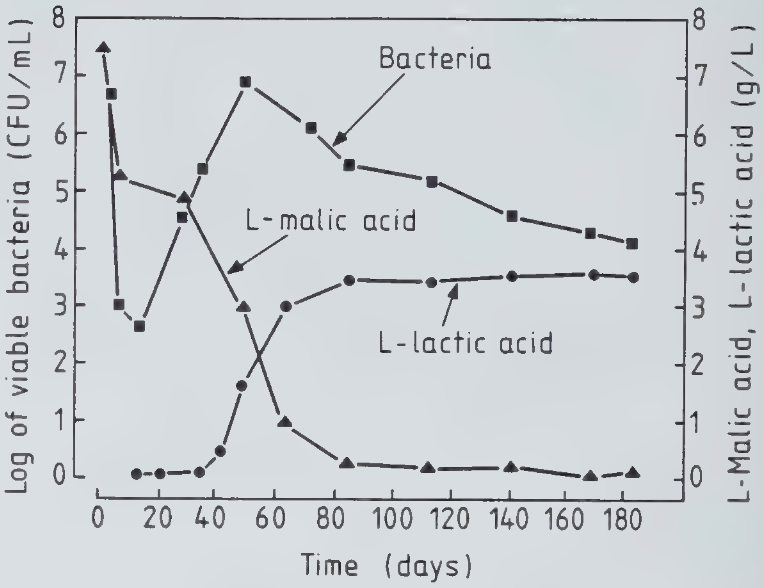

Fig. 1. *Pattern of traditional, delayed MLF in a Pennsylvania Chelois red table wine inoculated with a pure culture of* Lc. oenos *ML-34 at 1% inoculum (Beelman & Gallander 1979)*

The problem with such delayed MLF is that the wine must be stored under conditions favorable for bacterial growth (low SO_2, warm temperature, delayed second racking, no fining, etc.), until MLF completes. Portions of wine cellars are sometimes heated during the winter to encourage wines to complete MLF. Thus, the wine is susceptible to growth of spoilage microorganisms as well as the desired ML bacteria.

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Penn State Research

Development and utilization of starter culture technology necessary to induce rapid, predictable MLF in red wines has been a major emphasis of the enology research program at Pennsylvania State for several years. The first demonstration of simultaneous alcoholic-ML fermentation at Penn State was made in 1978, when large amounts of rehydrated, active-dry bacteria were added to a hot-pressed grape must at the same time as yeast inoculation (Beelman & Freas 1979, Beelman 1980). The rate of MLF was directly related to the number of bacteria added.

When large populations of viable bacteria were added (resultant population of 3.6 X 10^8 colony-forming units (CFU)/mL), MLF finished in two days, prior to alcoholic fermentation completion (Table 1). This malolactic conversion was the result of the metabolism of the large number of resting cells (*as opposed to cells in a growth phase*), since the bacterial population in this wine was 1.5 X 10^8 CFU/mL after 2 days.

Table I. *Stimulation of MLF in wine by direct inoculation with rehydrated, active-dry bacterial cultures.**

Vol. of freeze-dried culture added to must (mL/2.5)	Viable bacteria in must after inoculation (CFU/mL)	Malolactic fermentation complete (Days)	Volatile acidity in finished wine (g/L)
0	4.1 x 10^1	78	0.35
1	4.3 x 10^6	28	0.37
10	4.4 x 10^7	14	0.35
100	3.6 x 10^8	2	0.28

**A hot-pressed de Chaunac must treated with 25 mg/L SO_2 was employed. Must analysis was 20.9° Brix, 9.1 g/L titratable acidity, and 3.45 pH. This must was inoculated with rehydrated (1:10 in distilled water), active-dry yeast (Fermivin, G.B. Fermentation Industries) to a viable population of approximately 1 X 10^6 CFU/mL. Various volumes of concentrated (10x), rehydrated, active-dry bacterial culture (*Lc. *oenos PSU-1) were added immediately after yeast inoculation. (Beelman 1980).*

Addition of this quantity of active-dry bacteria in commercial-sized lots may not be economically practical. However, lesser inoculations, resulting in a lower viable population such as 4.3 X 10^6 CFU/mL, induced a significantly faster MLF when compared to the uninoculated control. [Cell counts are obtained with the plate count procedure following serial dilution of a wine.] (Stanier, Adelberg, Ingraham, Wheelis, 1979)

Timing of the malolactic fermentation in this experiment had no apparent influence on volatile acidity production in these wines. This was in contrast to reports from French enologists (Ribereau-Gayon *et al.* 1975, Lafon-Lafourcade 1980) who thought that MLF in the presence of sugars would cause increased volatile acidity due to diverted (side-tracked) metabolism. However, their experiment may not truly duplicate production environments because they apparently did not add any pure yeast cultures to start alcoholic fermentation as is done routinely in this country.

Direct utilization of active-dry cultures was a convenient method of inoculation, but may not be economically practical with costs of the required volumes of cultures. Subsequent research explored methods of building up the volume as liquid culture prior to inoculation of wines (Beelman & Duke 1984). This work focused on methods of growing the active-dry bacteria in mixed culture with wine yeast in grape juice.

Grape juice was inoculated with relatively large numbers of rehydrated viable bacteria (~ 10^6 CFU/mL) concurrently with small numbers (~ 10^4 CFU/mL) of viable yeasts (Beelman

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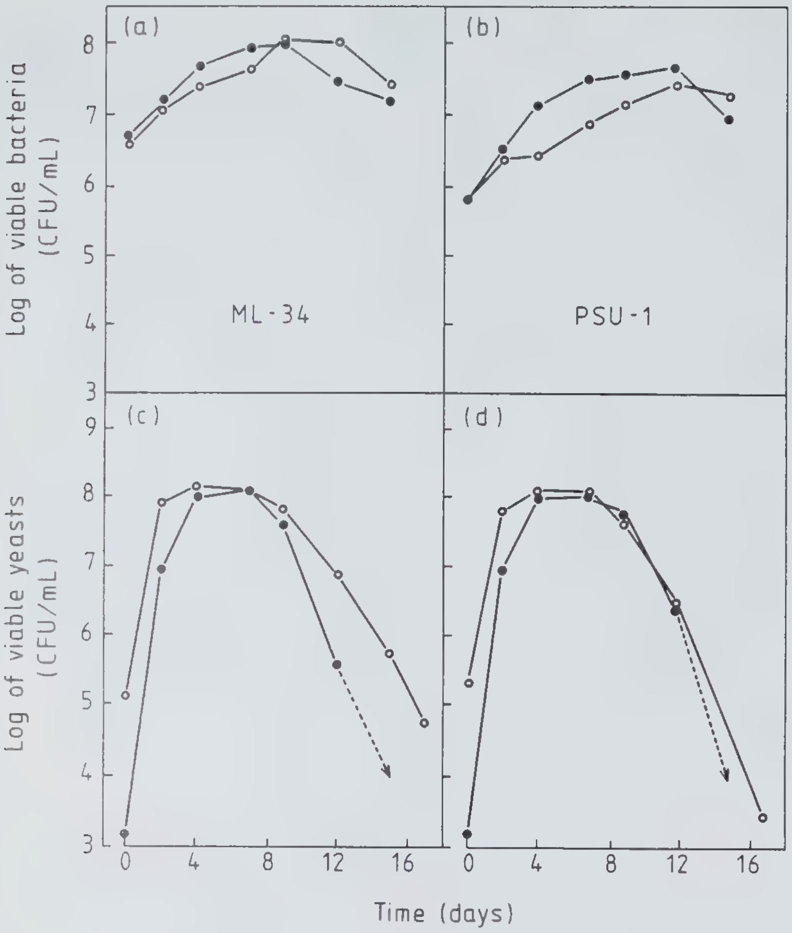


Fig. 2. *Growth of wine yeast (c,d) and malolactic bacteria (a,b) (*Lc. oenos *strains ML-34 and PSU-1) in California red grape juice concentrate reconstituted to approximately 20° Brix.*

Two levels of yeast inoculation were employed following rehydration in warm water: a moderate level of about 10^5 cells/ml (●) and a low level of about 10^3 cells/ml (○). Bacterial inoculation was by addition of 0.5% (v/v) of 7-day-old GJM cultures yielding 5-9 X 10^6 CFU/mL. One-liter volumes of culture were incubated for 17 days at 68°F in 1.5L glass jugs.

1980). Rehydrated, active-dry Montrachet (Red Star, Universal Foods Corp.) was used as the source of yeast inoculation in all experiments. Under such conditions, mixed cultures with optimum activity for obtaining simultaneous fermentation could be obtained in 6–12 days' incubation at 20°C.

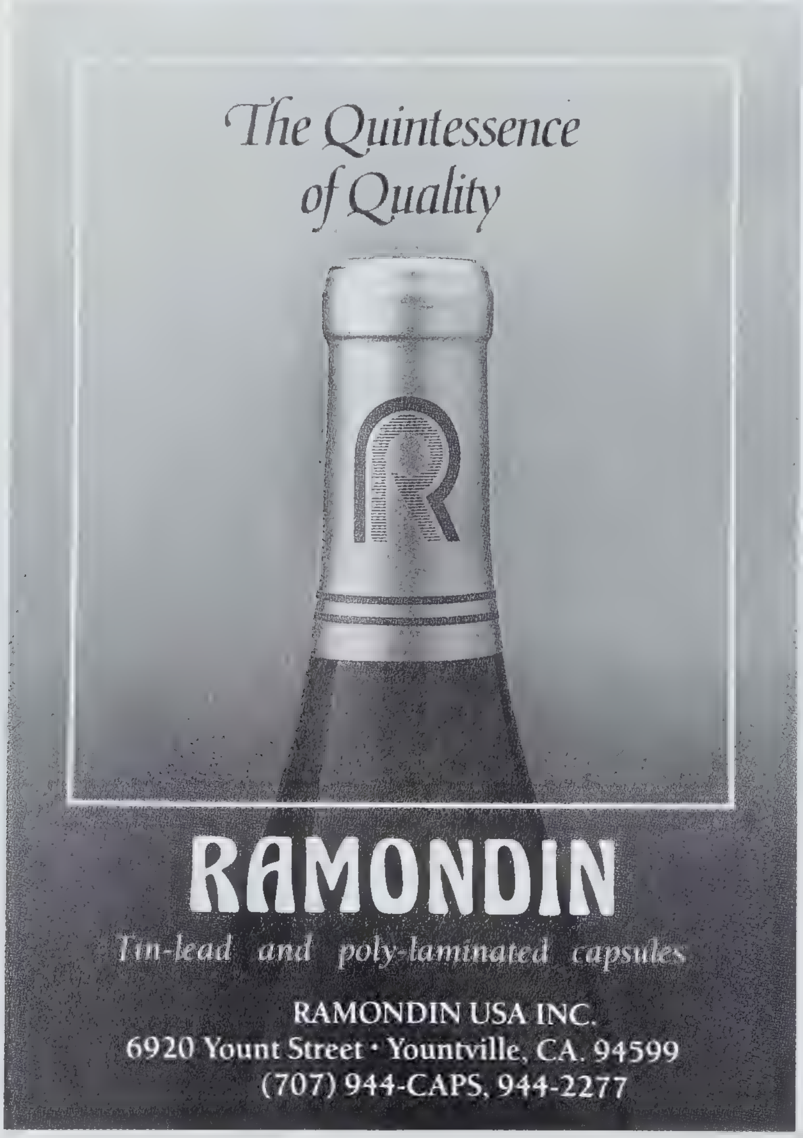
Initial experiments were conducted to determine the effectiveness of mixed yeast/*Leuconostoc* cultures to stimulate MLF in Pennsylvania wines. Inoculation of musts or new wines with about 5% (v/v) of these mixed cultures generally stimulated rapid MLFs (Beelman 1980). Early inoculation with mixed cultures was found to be quite important. When the culture was added initially (with the normal yeast inoculation), simultaneous alcoholic-malolactic fermentation was accomplished (Table II—Beelman & Duke 1984 and Fig. 2 in Beelman & Kunkee 1984).

Research in California

The preliminary success of stimulating simultaneous malolactic and alcoholic fermentations in Pennsylvania wines using the expanded mixed cultures led us to attempt the same approach under California conditions. Malolactic bacteria were grown in mixed culture with wine yeast in reconstituted (to 21° Brix) California red grape juice concentrate.

Following reconstitution, this juice had a 3.9 pH with no de-

continued on page 50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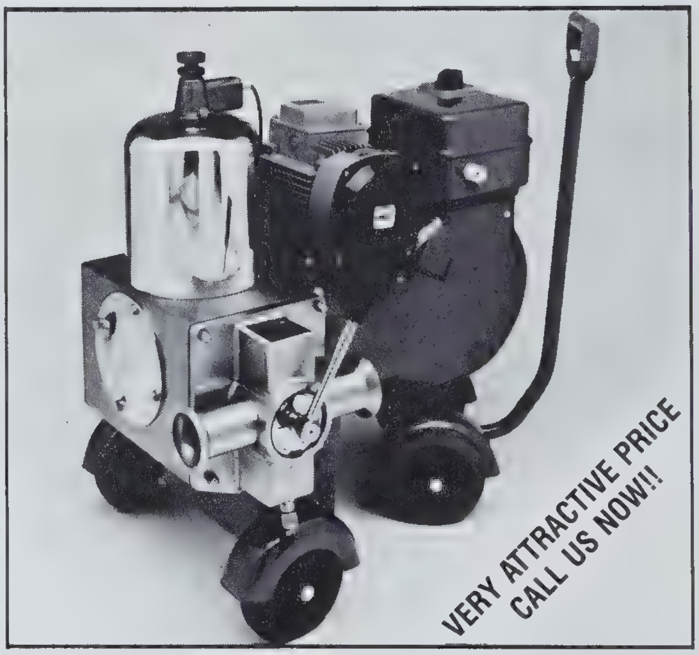

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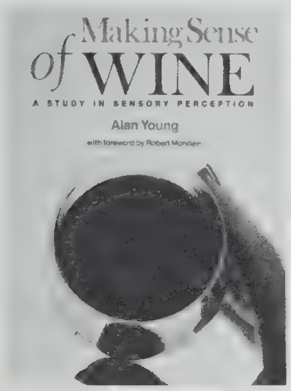

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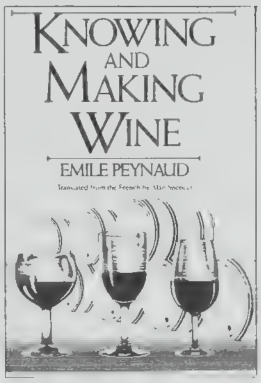

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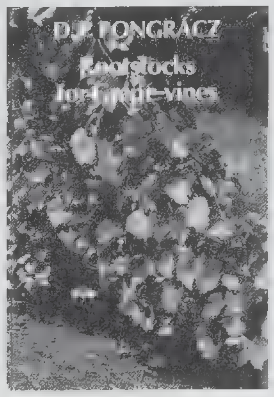

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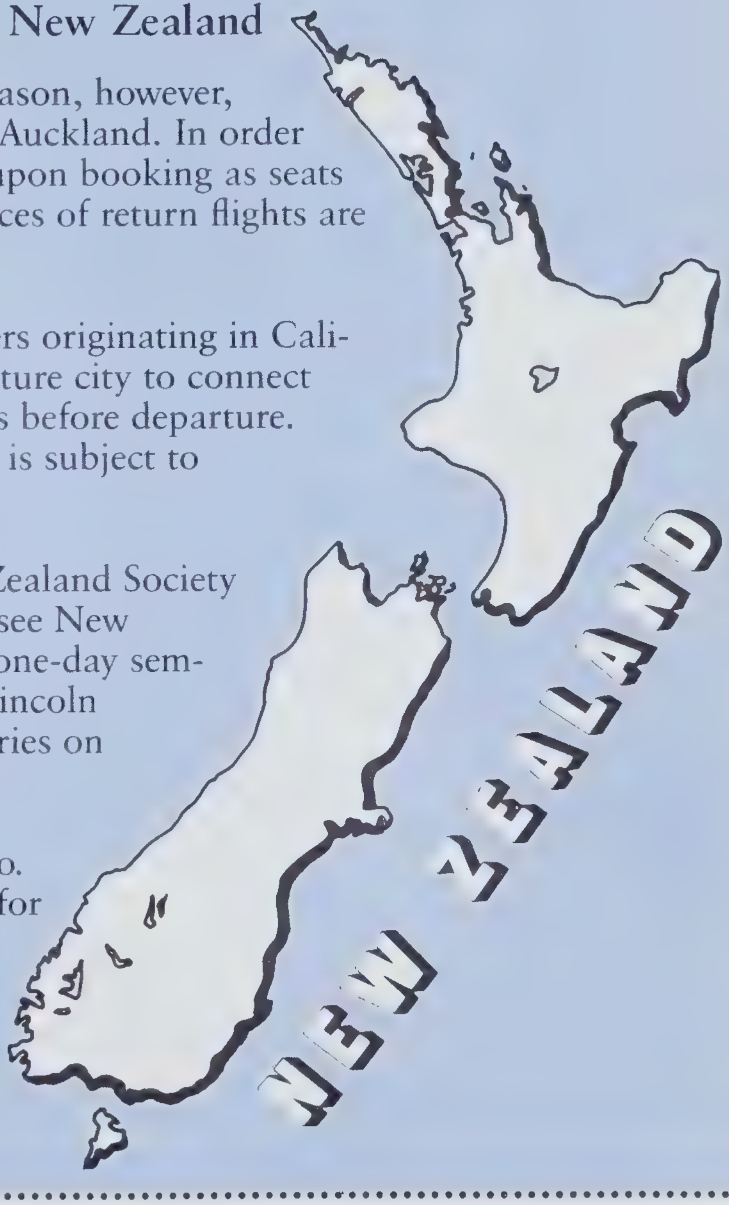

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tectable free or total SO_2. In most cases, bacteria used for inoculation were grown in Grape Juice Medium (GJM) as described by Kunkee (1981), and rehydrated, active-dry yeast were used as initial yeast inocula. Stationary-phase (stage of maximum population where cells are not reproducing and are physiologically stable) malolactic bacteria populations of about 1 X 10^8 CFU/mL were obtained in 6–10 days with either ML-34 or PSU-1 strains of *Lc. oenos* (Fig. 2).

After about seven days, both yeast and bacteria were in stationary phase at the same time. Most rapid bacterial growth was achieved when the low level of yeast inoculation was employed as observed earlier (Beelman 1980). Thus, a low level of yeast inoculation was carried out in all subsequent experiments. In some cases, either rehydrated, active-dry bacterial cultures were used as the initial bacterial inocula as a matter of convenience or larger volumes of GJM cultures were employed to achieve stationary-phase bacterial populations more rapidly.

ML inoculation of California Cabernet Sauvignon wines (not treated with SO_2) with large volumes (4% v/v) of these mixed cultures at the time of normal yeast inoculation was successful in inducing simultaneous alcoholic-malolactic fermentation. In one experiment (Table II), mixed cultures of malolactic bacteria employing both freeze-dried and GJM cultures as original bacterial inocula were about equally effective in inducing simultaneous fermentation.

Cultures containing PSU-1 appeared to induce slightly more rapid MLFs than ML-34 with nearly equal populations of viable bacteria. Informal sensory examination of these wines following simultaneous alcoholic-malolactic fermentation indicated that all wines were pleasant with no noticeable defects. However, another experiment was conducted to examine more carefully effects on wine quality.

Cabernet Sauvignon musts treated with both 0 and 50 mg/L SO_2 at crush were inoculated with various volumes (0.04–4.0%) of mixed starter cultures in order to induce both delayed malolactic fermentation and simultaneous alcoholic/malolactic fermentations. When larger volumes (2% and 4%) were employed, rapid malolactic fermentations occurred even when SO_2 was added. Since alcoholic fermentation was complete in seven days, malolactic fermentation occurred simultaneously in all of these wines.

However, in this experiment significant bacterial growth presumably occurred during MLF in these wines as demonstrated in a subsequent experiment conducted under similar conditions (Fig. 3). This was a major contrast to the earlier experiment (Table I), when malolactic conversion took place as a result of malate metabolism of large numbers of non-multiplying cells.

When no SO_2 was added to the must initially time required for completion of MLF corresponded to the amount of mixed starter culture added; even the uninoculated control wines completed MLF 38 days following crush. However, none of the musts treated with 50 mg/L SO_2 and inoculated with less than

Table II. *Stimulation of simultaneous alcoholic/malolactic fermentation in California Cabernet Sauvignon.**

Strain	Bacteria in mixed starter culture: Seed Culture (source-mL/L)	Bacteria in mixed starter culture: Viable population at inoculation (CFU/mL x 10^7)	Fermentation complete (Days): Malolactic	Fermentation complete (Days): Alcoholic
ML-34	GJM-45.0	4.6	6.0	9.0
ML-34	FD-0.10	3.1	6.0	9.0
PSU-1	GJM-45.0	2.3	4.0	9.0
PSU-1	FD-0.10	2.1	6.0	9.0
No bacteria added (control)		–	> 152	9.0

**Grapes were 1979 vintage harvested in Davis, CA, at 23.1° Brix, 7.2 g/L titratable acidity, and 3.8 pH. Musts were not treated with SO_2 at crush and were inoculated with both rehydrated active-dry yeast (* ≃ 1 X 10^6 cells/mL) and 4% (v/v) of 14-day-old mixed yeast and malolactic bacterial (Lc. oenos) *ML-34 or PSU-1) starter cultures grown in reconstituted (California) grape juice concentrate. Musts were fermented on the skins 4 days at 68°F, pressed at 3° Brix, racked at dryness (7 days), treated with 50 mg/L SO_2 and stored at 55°F. Mixed yeast and bacterial cultures were prepared using both freeze-dried (FD) and Grape Juice Medium (GJM) cultures as original source of bacterial inoculation.*

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Table III. *Stimulation of simultaneous alcoholic/malolactic fermentation in California Cabernet Sauvignon.**

	No SO_2 added			50 mg/L SO_2 added		
Inoculation (%, v/v)	**MLF complete (Days)**	**Volatile acidity (g/L)**	**Sensory score (1-20)**	**MLF complete (Days)**	**Volatile acidity (g/L)**	**Sensory score (1-20)**
0.00	38	0.37	13.4	> 54	0.24	12.9
0.04	27	0.36	13.6	> 54	0.24	11.3
0.40	15	0.35	13.3	> 54	0.25	12.9
2.00	7	0.34	13.6	9	0.37	13.1
4.00	5	0.32	13.8	6	0.35	12.8

**Grapes were 1979 vintage harvested in Clarksburg at 23.7° Brix, 8.7 g/L titratable acidity, and 3.6 pH. Musts were inoculated at crush with rehydrated active-dry yeast (* ~ 6×10^5 cells/mL) *and various amounts of mixed yeast-malolactic bacteria (*Lc. oenos *ML-34) starter cultures grown in reconstituted grape juice concentrate as (table II or fig. 2). Musts were fermented on the skins for four days at 68°F, pressed at 4° Brix, racked at dryness (7 days), and again at 54 days. Half of the lots were treated with 50 mg/L SO_2 at crush and all lots were treated with 50 mg/L SO_2 at the second racking and held at 55°F.*

2% volume of mixed starter cultures had completed MLF within 54 days following crush, at which time the wines were racked for the second time, sulfited (50 mg/L SO2), and placed in storage at 55°F.

Evaluation of the finished wines from this experiment (Table III) revealed that rapid MLFs, even those which occurred simultaneous with alcoholic fermentation, had no adverse effect on wine sensory quality or volatile acidity when compared with that of wines that had delayed MLFs.

Volatile acidity levels of all wines that completed malolactic fermentation were nearly equal and within normal levels. This confirmed the earlier observation (Table I) that simultaneous alcoholic-malolactic fermentation induced under controlled conditions did not result in increased levels of volatile acidity.

However, in this experiment significant bacterial growth presumably occurred during MLF in these wines as demonstrated in a subsequent experiment conducted under similar conditions (Fig. 4). This was a major contrast to the earlier experiment (Table I), when malolactic conversion took place as a result of malate metabolism of large numbers of non-multiplying cells.

This experiment demonstrated that bacteria growing in wine with large amounts of fermentable carbohydrate under conditions described herein do not produce abnormal amounts of acetic acid or any other metabolite that would obviously harm wine quality. Winemakers at Robert Mondavi Winery in the Napa Valley, CA, using inoculation procedures similar to those described herein, have induced simultaneous alcoholic-malolactic fermentations under commercial conditions (Blackburn 1984). They also found no increase in volatile acidity and preferred the sensory properties of wines with early as opposed to delayed MLF.

It appears that the concern about increased volatile acidity formation during early MLF is probably unfounded if both alcoholic and malolactic fermentations are induced by inoculation as described above. In order to prevent increased volatile

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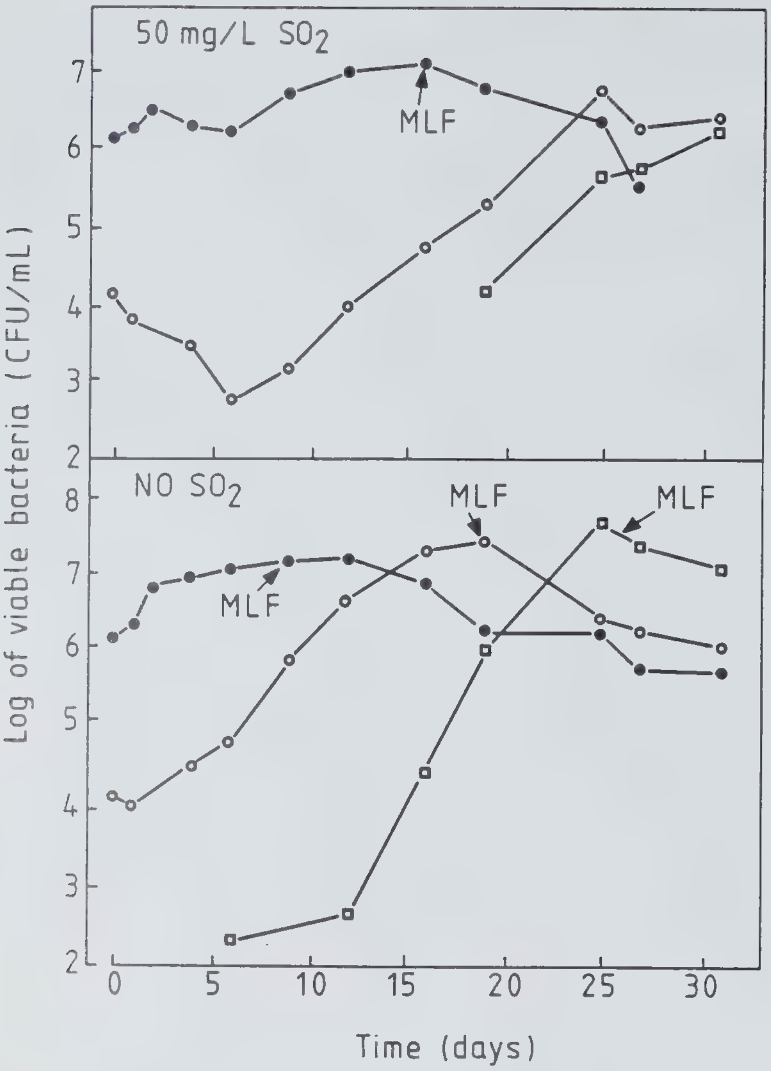

Fig. 3. *Growth of* Lc. oenos *ML-34 in a red California wine following inoculation with various volumes of 8-day-old mixed yeast-bacterial starter cultures.*

Must was prepared from the same red California grape juice concentrate used to prepare the mixed starter cultures (Fig. 2). It was reconstituted to 21.8° Brix, and pH was decreased to 3.7 by addition of 2 g/L of L-malic acid. Half of the must was treated with 50 mg/L SO_2 and half was left untreated. All lots were inoculated with rehydrated, active-dry Montrachet yeast (~ 1 X 10^6 cells/mL) followed by 0 (□), 0.4 (●) and 4.0% (○) volumes of mixed starter cultures of ML-34 and yeast. Arrows indicate completion of malolactic fermentation as determined by paper chromatography.

acidity, it may be important that the MLF *not* be allowed to start *before* the yeasts start metabolizing some sugar, as may occur when no yeast inoculation is made.

French enologists (Ribereau-Gayon *et al.* 1975, Lafon-Lafourcade 1980) have indicated that if malolactic fermentation occurs when fermentable sugar remains, increased levels of acetic acid may be formed as the result of bacterial degradation of sugars after the complete disappearance of malic acid. [It is possible that this depends on the malolactic strain, but no hard evidence is available.] This observation has led many winemakers to be cautious regarding stimulation of early MLF. However, our work indicates that, under controlled conditions, formation of volatile acidity was not a problem.

In Lafon-Lafourcade's experiment (1980) where abnormal levels of acetic acid were found in a red grape must (presumably by bacterial metabolism of sugars after malic acid conversion was complete), no mention was made regarding yeast inoculation, yeast growth, or alcoholic fermentation rate. [Perhaps no yeast inoculation was used in these

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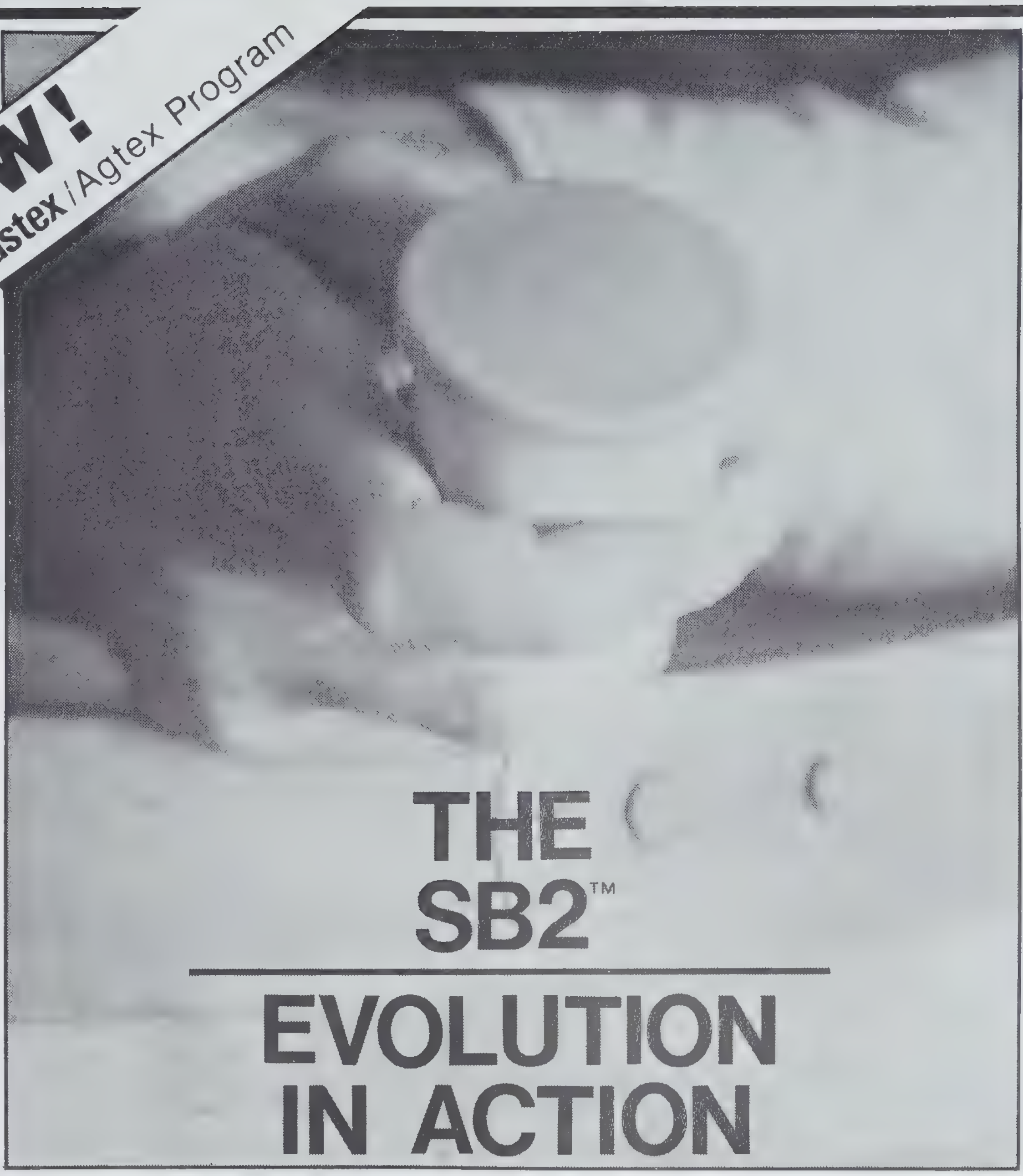

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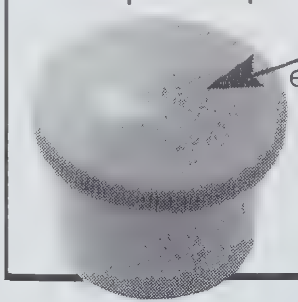

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Another French experiment (Lafon-Lafourcade *et al.* 1980) was conducted in synthetic media, presumably using inoculation with pure cultures of malolactic bacteria. They found that acetate formation was inhibited by the presence of malate in the medium while it was stimulated by the presence of glycerol. Hence, the composition of the must or fermenting wine and/or interactions between the yeast and bacteria may be involved in the formation of increased acetate.

For example, bacteria may cause high volatile acidity when growing in a must which has high sugar content (*i.e.*, before significant yeast growth, or when no yeast cultures are added). On the other hand, some yeasts may produce higher levels of glycerol, thereby possibly stimulating formation of acetate.

One current theory is that increased acetate may be produced by yeast growing under stressed conditions (Kunkee, R.E.—personal communication with P. Ribereau-Gayon 1984). Such stress could be caused by lack of certain nutrients in some musts or by metabolic antagonism due to extensive bacterial growth occurring in the absence of significant yeast growth. Significantly lower yeast populations common in French vinification could cause increased yeast stress due to the competition by large populations of actively-growing bacteria.

Recent Research in Pennsylvania

The use of yeast/malolactic mixed culture to induce both fermentations was attempted. The same California grape juice concentrate as that used earlier in California was used to grow the starter cultures. Rapid bacterial growth and MLF (10 days) occurred in musts inoculated with the mixed culture only: but more rapid MLF (7 days) occurred when a *separate*, yeast-*only* culture was also added to the musts despite a very similar pattern of bacterial growth (Fig. 4).

One practical improvement in mixed starter culture technology for rapid MLF would be the use of white grape juice as a medium for preparing cultures. The major advantage of this

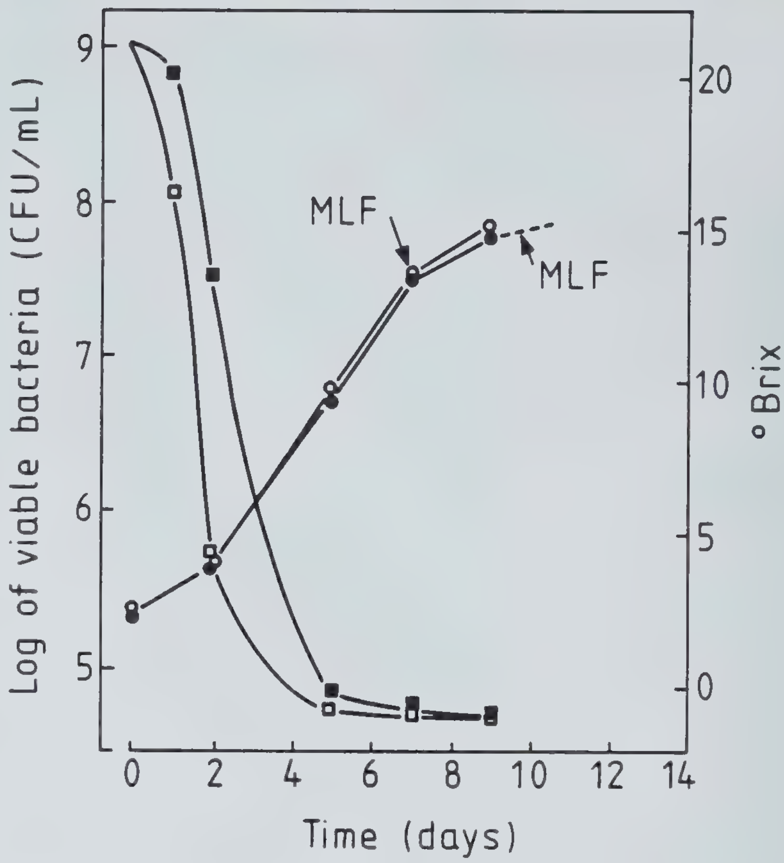

Fig. 4. *A bacteria growth curve and alcoholic fermentation (drop in °Brix) tracking curve. Simultaneous alcoholic (□, ■)-malolactic (●, ○) fermentation induced in a Pennsylvania red table wine following inoculation with 5% (v/v) of an 8-day-old mixed yeast (Red Star Montrachet) and bacterial (Lc. oenos PSU-1) culture with (○, □) and without (●, ■) a separate inoculation of rehydrated active-dry Montrachet yeast.*

The musts were prepared from Chelois grapes of 1981 vintage harvested at 19.8° Brix (adjusted to 20.6° with sucrose) and 3.4 pH. No SO_2 was added at crush. Mixed cultures were grown in red California grape juice concentrate diluted to 10.5° Brix. Separate yeast inoculation (~ 1 X 10^6 cells/mL) was prepared by reconstituting active-dry Red Star Montrachet in water. Arrows indicate completion of MLF as determined by paper chromatography.

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approach would be the flexibility for use in both red and white wines. Attempts to grow mixed cultures in one California white grape juice concentrate were totally unsuccessful. This may have been caused by high levels of total SO_2 or lack of nutrients in this concentrate.

However, we had some success in studies using white grape juice prepared from early-maturing white grapes grown in Pennsylvania. We prepared mixed starter cultures for use during the entire vintage using procedures described above. However, bacterial growth in such white juice was considerably slower than that achieved in red juice or reconstituted red juice concentrates.

Also, by the time bacteria were in the stationary phase of growth, yeasts were well into the death cycle. (Beelman & Kunkee 1984). This could be caused by compositional differences between red and white musts such as the grape skin effect discussed by Beelman & Gallander, 1979.

Conclusions

Rapid malolactic fermentations as described above have several important advantages to the winemaker. Most importantly, winemakers have reasonable assurance that malolactic fermentations will occur under their control with a bacterial strain of their choice. With delayed malolactic fermentations, one is never quite sure which bacteria are responsible for the conversion.

Furthermore, the longer that malolactic fermentation is delayed, the more resistant the wine seems to become to the growth of the causative bacteria. It is often nearly impossible to induce malolactic fermentation in partially-finished wines, especially if they are high in acid or have a low pH and would benefit greatly from MLF's softening consequences.

Thus, stimulation of a simultaneous alcoholic-malolactic fermentation takes advantage of the fact that conditions for the growth of the bacteria are good at these early stages, and it occurs at a time when the wine is always closely monitored by the winemaking staff. Also, when fermentations are complete, the wine can begin to be biologically stabilized at the first racking, thereby preventing unwanted microbial activity during maturation and ageing.

In predicting future advances in fermentation technology in the wine industry, Goggi (1984) said, "In the future, the improvement of wine will be largely a biological pursuit. The winemaker will choose the exact, most suitable yeast and bacteria, and manipulate their reproduction for the most desirable fermentation."

We believe that the approach described above for control of simultaneous alcoholic-malolactic fermentation by using controlled inoculation of mixed yeast-bacterial starter cultures is a significant advance in that direction.

This paper is a revision of Beelman and Kunkee 1984, 'Inducing Simultaneous Malolactic-Alcoholic Fermentation in Red Table Wines', presented in Melbourne, Australia, at the Australian Society of Viticulture and Oenology.

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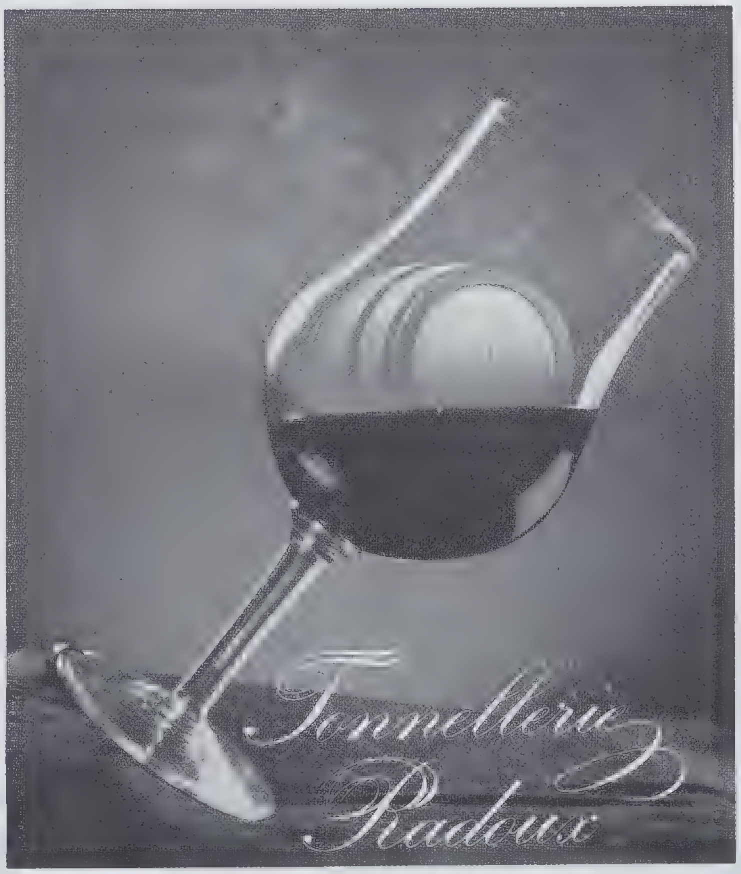

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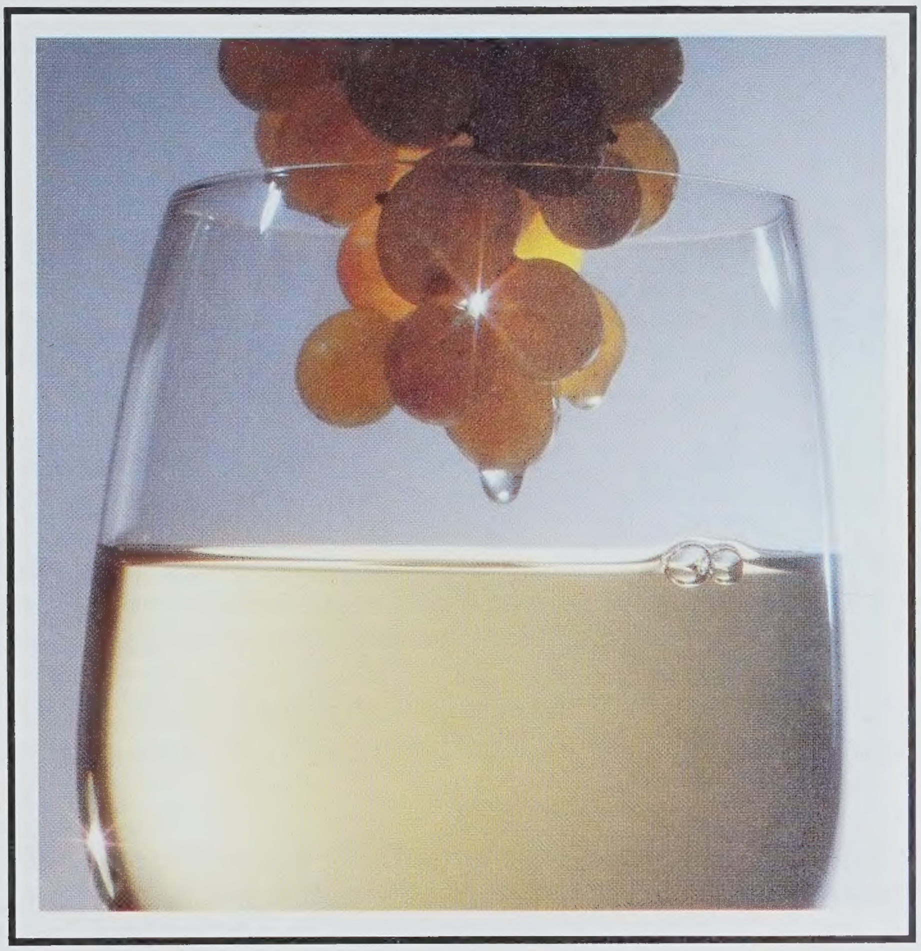

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ADVERTISER PRODUCT/SERVICE INDEX

BAG-IN-BOX (Equipment/Packaging)
Scholle Corp. ... 41

BARREL BROKER/COOPERAGE SUPPLIES
Barrel Builders ... 32
Boswell Company ... 56
Custom Cooperage ... 18
Innerstave ... 36
Sonoma Coopering Co. ... 40
Tonnelleries de Bourgogne ... 42
Tonnellerie Radoux ... 55
Tonnellerie Vicard ... 52

BARREL BUNGS
Barrel Builders ... 32
Boswell Company ... 56
ITW Fastex/Agtex ... 53

BARREL RACKS
Western Square Industries ... 29

BIRD NETTING
Bruce King ... 52
Country Wines ... 54
Wildlife Control Technology ... 42

BOTTLES (Glass)
ENCORE! (Sterilizing and Sales) ... 56

BOTTLING EQUIPMENT
CF NAPA ... 41
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
fp Packaging, Inc. ... 40
KLR Machines,Inc. ... 11
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12

BOTTLING SERVICES (Portable)
CF NAPA ... 41
Chateau Bottlers ... 41
Estate Bottling ... 56

CAPSULES
CF NAPA ... 41
fp Packaging, Inc. ... 40
KLR Machines,Inc. ... 11
Ramondin USA Inc. ... 46
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12

CENTRIFUGES
Centrico,Inc. ... 60
Process Engineers,Inc. ... 51

CHEMICALS
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
E T S ... 44
Pickering Winery Supply ... 35
VINQUIRY ... 43
The Wine Lab ... 41

CLEANING EQUIPMENT/SUPPLIES
AMETEK/Valley Foundry Div. ... 31
Butterworth,Inc. ... 7
Cellulo/Finer Filter Div. ... 40
Chemical Resources Corp. ... 16
The Compleat Winemaker ... 30
Key Industrial Associates ... 50
Pickering Winery Supply ... 35

COMPUTER SERVICES
Pickering Winery Supply ... 35
Jim Vahl ... 41

CORKS
fp Packaging,Inc. ... 40
KLR Machines,Inc. ... 11
Pickering Winery Supply ... 35
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3

CRUSHERS/STEMMERS
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
KLR Machines,Inc. ... 11
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Co.,Inc. ... 40 + 56

DEJUICERS
AMETEK/Valley Foundry Div. ... 31
KLR Machines,Inc. ... 11
Process Engineers,Inc. ... 51

ENGINEERING SERVICES
AMETEK/Valley Foundry Div. ... 31
Oneto & Arthur Engineering ... 40
Storm Engineering ... 40

ENZYMES
Cellulo/Finer Filter Div. ... 40
GENENCOR ... 57
Rohm Tech Inc. ... 9
Scott Laboratories,Inc. ... 3
The Wine Lab ... 41

FILTER EQUIPMENT
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
KLR Machines,Inc. ... 11
Pressure Filtration Specialists ... 4
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12

FILTER MEDIA
Cellulo/Finer Filter Div. ... 40
KLR Machines,Inc. ... 11
Manville Filtration & Minerals ... 33
Process Engineers,Inc. ... 51
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12
WITCO Chemical Corp. ... 10

FINING AGENTS
Cellulo/Finer Filter Div. ... 40
E T S ... 44
KLR Machines,Inc. ... 11
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12
The Wine Lab ... 41

FITTINGS (Stainless Steel)
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
JV Northwest Engineering ... 43
Key Industrial Associates ... 50
Process Engineers,Inc. ... 51
RLS Equipment Co.,Inc. ... 40 + 56
Santa Rosa Hydraulics ... 33
Spokane Metal Products ... 6

HEAT EXCHANGERS
AMETEK/Valley Foundry Div. ... 31
KLR Machines,Inc. ... 11
Pedia-Kreyer USA Inc. ... 27
Power Refrigeration Co. ... 59
Process Engineers,Inc. ... 51
Refrigeration Technology,Inc. ... 34
Scott Laboratories,Inc. ... 3

HOSE
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
Key Industrial Associates ... 50
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Corp. ... 40 + 56
Santa Rosa Hydraulics ... 33

IRRIGATION EQUIPMENT
ITW Fastex/Agtex ... 53
Parker Engineering ... 12
The Water Works ... 40

LABELS
Blake Printery ... 55
fp Packaging,Inc. ... 40
Gordon Graphics ... 30

LABORATORIES (Materials/Wine Analysis)
E T S ... 44
Scott Laboratories,Inc. ... 3
VINQUIRY ... 43
The Wine Lab ... 41

NURSERIES
Schloss Tucker-Ellis ... 40

PERSONNEL SERVICES
Snelling & Snelling ... 41

PRESSES
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
KLR Machines,Inc. ... 11
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3
SEN Machines,Inc. ... 12

PROCESS CONTROL SYSTEMS
The Compleat Winemaker ... 30
Process Engineers,Inc. ... 51
Santa Rosa Hydraulics ... 33

PROCESS PIPING
AMETEK/Valley Foundry Div. ... 31
JV Northwest Engineering ... 43
Key Industrial Associates ... 50
Process Engineers,Inc. ... 51

PROMOTIONAL MATERIALS
Blake Printery ... 55
Gordon Graphics ... 30

PUMPS
AMETEK/Valley Foundry Div. ... 31
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
Key Industrial Associates ... 50
KLR Machines,Inc. ... 11
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2
RLS Equipment Co.,Inc. ... 40 + 56
Scott Laboratories,Inc. ... 3

REFRIGERATION/COOLING
Edwards Engineering Corp. ... 54
KLR Machines, Inc. ... 11
Pedia-Kreyer USA Inc. ... 27
Power Refrigeration Co. ... 59
Power Refrigeration Parts Co. ... 56
Refrigeration Technology,Inc. ... 34

SPARKLING WINE EQUIPMENT
The Compleat Winemaker ... 30
fp Packaging,Inc. ... 40
Process Engineers,Inc. ... 51
Prospero's Equipment Corp. ... 2

TANKS (Metal)
AMETEK/Valley Foundry Div. ... 31
JV Northwest Engineering ... 43
Spokane Metal Products ... 6

TRANSPORTATION (Bulk Wine)
Tri-Transport,Inc. ... 17

TYING/TRAINING SUPPLIES
ITW Fastex/Agtex ... 53

VALVES
The Compleat Winemaker ... 30
Key Industrial Associates ... 50
Process Engineers,Inc. ... 51
RLS Equipment Co.,Inc. ... 40 + 56

WINE CASES (Wooden)
Atlas Box Co. ... 51

WINEMAKING CONSULTING
Steve MacRostie ... 40
VINQUIRY ... 43
The Wine Lab ... 41

YEAST
Cellulo/Finer Filter Div. ... 40
The Compleat Winemaker ... 30
Criveller Co. ... 35 + 46
Universal Foods Corp. ... 8

YEAST/MALOLACTIC BACTERIA
E T S ... 44
Scott Laboratories,Inc. ... 3
VINQUIRY ... 43
The Wine Lab ... 41

MALOLACTIC BACTERIA (only)
Pickering Winery Supply ... 35

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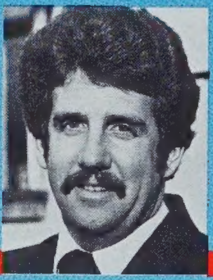

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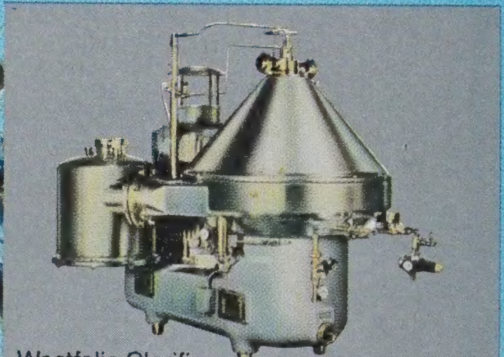

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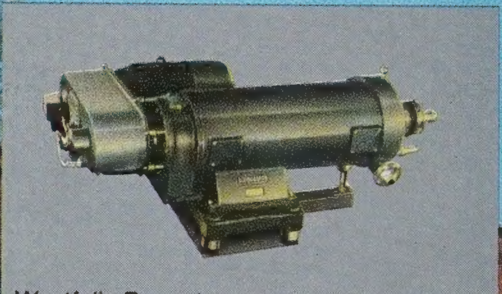

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